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ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

THE GUILD OF GAS MANAGERS COMBINING BUSINESS WITH PLEASURE.

The members of the Guild of Gas Managers on the occasion of their last regular monthly meeting determined to strike out on a new line, and concluded that there was no good reason why that new line should not tend towards the acceptance of an invitation to visit the city of Manchester, N. H. Brother L. P. Gerould, of the Manchester Gas Light Company, promised that if they would but accept his invitation they should have no reason to regret such action; and his words were so pressing, and the scheme looked so tempting, that Gerould and his merry men carried their point, hence did the Guild, on the occasion of its June gathering (Friday, 12), forsake "hot and stuffy" Boston, eager for the chance to enjoy an outing in the land known to our forefathers (and even to ourselves) as the Switzerland of America, and the charm of whose scenery has many a time been sighed after by the brave and venturesome lads compelled by circumstance or necessity to turn their backs upon the old-time homesteads that nestled so cosily in valley or on hillside amidst all the glories so lavishly bestowed by nature upon the Granite State. But to come back to the Guild and its doings on June 12th.

The members and guests assembled at the Boston and Lowell depot in readiness to board the proper train, which was to "pull out" at 8:30 A.M., and deliver the party safe and sound in Mr. Gerould's care after a sharp run of two and one-half hours. The trainmen were as good as their promise, for quite on time the iron horse slowed up alongside the platform at the Manchester depot, where with smiling faces and outstretched hands stood the jolly host and his coadjutors—who on this occasion were his sons, Charlie and Ned. A cordial gripping of the fingers, a hurried word or two of welcome, and off the boys were whisked in carriages to the works of the Manchester Company. What could hardly (for it was rather on the substantial side) be called a luncheon was in readiness for the hungry ones; and the fact that the "luncheon" was of the solid sort seemed to be thoroughly understood and appreciated, since the manner and speed of its disappearance betokened the possibility that many of the party not only "got up," but also had "left their homes before breakfast." With the scant remnants of the feast (their scantiness spoke volumes about the stoutness of the visitors' appetites) spread thinly over the whilom heavily laden board, "the master waved his hand," and in groups of twos and threes the tourists made an inspection of the Manchester gas plant; and it is little wonder that Brother Gerould is inclined to regard it as "quite an affair." It does credit to every one connected with it. The inspection completed the party returned to the Company's office for the purpose of holding the regular business meeting. When Chairman A. B. Slater called the gathering to order it was observed that the following named members were in attendance: Secretary E. G. Pratt, and Messrs. W. A. Stedman, L. P. Gerould, John Andrew, Geo. D. Cabot, C. J. R. Humphreys, C. S. Spaulding, John Cabot, O. E. Cushing, C. F. Prichard, R. B. Taber, Wm. B. Durfee, F. S. Richardson, J. H. Rollins, and S. G. Stiness. As specially invited guests were recognized Messrs. John P. Harbison, of Hartford, Conn.; Fred. J. Davis, of Waltham, Mass.; Wm. H. Down, New York city; J. A. Waldo, W. Coburn, and C. H. Sprague, of Boston, Mass.

When preliminary matters had been disposed of, Chairman Slater read a paper on, "The Pelouze and Audouin Condenser," which was chiefly de-

voted to a recapitulation of the results obtained in the use of one of these instruments at the works of the Providence (R. I.) Gas Light Company. Perhaps we could prevail upon Mr. Slater to forward us this paper, in order that we may give our readers the benefit of his wise judgment—for be it said, and we believe we have said it before, that Slater is one of those cool-headed gentlemen, whose opinion in regard to the merits or demerits of a piece of gas works machinery is well worth having. A general discussion on the subject matter of the paper, afterwards branching out to other questions of interest to gas men, was carried on. The "talk" occupied the better portion of an hour's time, when the entire party took their seats in carriages destined to convey them to Fletcher's Island, which is separated from the Manchester works by probably 3½ miles of distance. The "Island" was reached at 2 P.M., and so happily had the journey been timed that host, members and guests were just in the "nick of time" to see the covers lifted from various dishes which contained all that goes to make up a noble specimen of the fish dinner. Excellently was it prepared; energetically was it consumed. The flavor, smack, spice—or call it what you will—of a Yankee fish dinner is well known to the New Englander; pity it is that it is not better known to the New Yorker. Some of those learned thinkers who are disposed to assert, and who do assert, that fish food is a great supporter of cerebration, should have been present at Fletcher's Island at that fish dinner, in order that they might have been witnesses to the mental activity which there and then prevailed. And by way of saying adieu to the late phosphoric-producing feast, it may be incidentally remarked that the crumbs left over would not have gone very far towards allaying the pangs of hunger experienced by a large and lively flock of Anglo-American sparrows.

After dinner the phosphor-charged party boarded a small and "natty" steamer that rejoices in the rather democratic name of Joe Cobb, for the purpose of enjoying a trip on the shimmering waters of Lake Massabosic (we won't be positive about the orthodoxy of our orthography), a beautiful silvery sheet of water, possibly 1½ miles in length by half a mile in width. the location of which is so convenient to Manchester that it has become famous in that vicinity for its delightfulness as a summer retreat for the many. This lake is also the source from which the city of Manchester derives its water supply, and the excellent qualities thereof have made it famous as a beverage throughout the Eastern States—although there are other beverages in prim New England that are equally well known to fame.

The trip over the Massabosic was heartily enjoyed, although if the "Cobb" had been bigger no one would have found any fault over the increase in her dimensions. Shore being made, the party turned landsmen once more and sought the shelter of the hotel piazzas, where pleasant conversation caused the minutes to fly swiftly, though not idly, by. Old Father Time is just the same steady-going chap on the borders of Massabosic that he is in Wall street, and when his "reckoners," in the shape of several Waltham chronometers, proclaimed 4:30 P.M., hosts and guests re-entered their carriages, so that they might be back at Manchester in time for the "5:37 train" for Boston.

The Jehus kept their steeds to their duty, and at the appointed hour there they were, ready to start for the "Hub." During the short wait at the depot a sort of special and impromptu meeting was organized. It was convened for the purpose of telling Brother Gerould and his sons just what was thought about them. We are afraid they blushed somewhat over the things that were said; and we are certain that they are thoroughly proficient in a knowledge of the pleasing art of playing the entertainer.

THE CONSUMERS COMPANY OF CHICAGO, ILLS.

In our item columns of last issue we made mention of a point or two in connection with the Consumers Gas Fuel and Light Company, of Chicago, Ills. Since the matter spoken of there must still be fresh in the memories of our readers, it is unnecessary that recapitulation of it be made now; and so all that remains with us for the present is to put upon record the latest news in regard to gas matters at the Lake City.

On Saturday, June 27, the New York *Daily Times* contained the following paragraph:

"CHICAGO, June 26.—Chas. C. Swinborne entered a judgment to-day against the Consumers Gas, Fuel, and Light Company, of this city, for $26,250, and an execution was recorded against the company. The fact that such an execution had been recorded created a great deal of surprise, and no end of talk in business circles. The company was chartered in December, 1881, with a capital stock of $500,000. The incorporators were J. W. Brockway, R. S. Tuthill, G. H. Harlow, M. A. Farwell, and A. C. Calkins. Most of these gentlemen were from Philadelphia. Subsequently the capital was increased to three millions of dollars, all paid up. The company has a bonded indebtedness of two million dollars, secured by first mortgage, and has issued $300,000 debenture bonds, $150,000 of which sum is outstanding. A month ago it borrowed from the Corn Exchange Bank $26,250 for thirty days, giving as security debenture bonds. The claim passed into Mr. Swinborne's hands, and, being unable to secure payment, he entered a judgment against the company. E. C. Judson, president of the company, states that the surplus fund is exhausted, and there was no money with which to pay the Swinborne claim. The business, Mr. Judson says, is very good, and the embarrassment, which he asserts is but temporary, is due to large expenditures in making improvements. There will be no cessation of business. The general impression is that the company will be able to weather the crisis in its affairs, although suffering from bad management. * * * The gas station cost $1,250,000. * * *"

It is rather difficult to understand what Mr. Swinborne's (that name has a bad sound) action means, although it would not surprise us in the least if it ultimately turned out that the stockholders are to be disposed of. If the *Times* man's statement is to be taken at its face value, the wiping out of the stockholders need not much interfere with their peace of mind. He says that the company has a bonded indebtedness aggregating $2,150,000, and that its gas station (probably meaning the manufacturing plant) cost 1½ millions of dollars. The stockholders may rest assured that the "gas station" has not increased any in value or worth since it was built; and they may also be perfectly well content over the fact that the remaining $900,000 in bonds covers, and far more than covers, every possible article of value owned or enjoyed by the Consumers Company. Indeed, take it all in all, it appears as though some portion of the Consumers Company is about to be consumed—a fate that it richly deserves. It would be real saddening to learn that the surplus fund was exhausted, were it not that it requires so lively an exercise of imagination to call to mind the time that the company ever had a surplus fund. There will soon be some queer developments in Chicago gas affairs.

The Actual Candle Power of Arc Lamps.

By H. C. ADAMS.

There has been a great deal of discussion over the matter of the actual candle power of the arc lamps, and it is more than probable that the results of careful measurement by experts will be of interest. Below is given a short summary of the report of the examining committee appointed by the Franklin Institute, at the Electrical Exhibition held last fall in Philadelphia, Pa.:

Name of Lamp.	Candle Power. Horizontal.	45 Deg.	Horse Power per Lamp.
Arago	273	583	.824
Bali	223	485	.432
Brush (1,200)	180	613	.466
Brush (2,000)	389	1,373	.785
Diehl	323	830	.754
Richter	313	894	.812
Van de Poele	333	1,162	.817
Western	263	266	.617

From an examination of the tables from which the above figures are taken we find that the point of minimum illumination lies in the horizontal plane; and from that position the illumination increases as we elevate the lamp until we reach 45°, where is found the maximum of light. As we increase the angle over 45° the illumination gradually decreases. The distribution of the light down at such an angle is accounted for by the crater always formed in the upper or positive carbon, which is the source of the greater amount of light, and acts in some degree as a deflector.

Ten observations of each lamp were made at each of the several altitudes measured; and the variation in the intensity of each lamp during the test at any altitude was found to be very great. For instance, the Arago lamp, at altitude 56° 40′, varied from 307 to 626-candle power; and the Brush (nominal) 2,000-candle lamp varied, in the horizontal, from 213 to 524-candle power. The Brush lamp made the best showing in the tests. It is to be regretted that the United States and Thomson-Houston lamps were not submitted.

The Market for Gas Securities.

About the most ridiculous thing ever noticed in connection with the gas share market of this city is the tomfoolery indulged in by the manipulators of Equitable quotations. Before the ink was dry on our figures as given in June 16th issue the shares had been pegged-up just 15 points, or from 116 to 131. Our "Market for Securities" in last number was written up on afternoon of Saturday, June 13th, and on that date the very best bid made for a small lot of the stock was 116½: yet, on the following Tuesday, and without cause or reason other than could be traced to the absorption of two or three small parcels held by not over-confident investors, the insiders had put the quotation up to 131. Those who hold Equitable at or below 110 have a pretty good thing of it, and need not mind much what the "pegger's" valuation is; but such as may have been tempted to purchase between 110 and 125 had better let the insiders take the stock at the ruling quotation—*i. e.*, at noon of June 30th, 137, bid. Consolidated gas is strong—the trading for fortnight opened at 94, highest price was 98½, and figure at time of writing is 96 to 96¼. This stock is yet a purchase. Brooklyn shares are very strong, Fulton Municipal being at 160 to 162, and Williamsburgh at 152 to 155. The Citizens and Metropolitan Companies have declared and paid semi-annual dividends of 3 per cent.

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[Official Report—Continued from Volume XLII., page 315.]

Eighth Annual Meeting of the Western Gas Association.

Held at the Tremont House, Chicago, Ills., May 13, 14, and 15, 1885.

First Day—Afternoon Session.

With the appointment of Committee to name a place wherein to hold next annual meeting, routine business for the time was disposed of, and the Chairman announced that the reading of papers would be proceeded with. Mr. G. A. Hyde, Sr., Engineer to the Cleveland (Ohio) Gas Light and Coke Company, was introduced to the Convention as the contributor of a paper on the subject of—

PRESSURE OF GAS IN STREET MAINS.

The gentleman read as follows:

The subject of pressure of gas in street mains is one of great importance to gas companies, and is also of vital interest to gas consumers. It seems to me, speaking in a general way, of course, that it has not received the attention which its importance should command, even although some have given the subject much careful study, and have invented useful devices looking to the regulation of the same. At the present time the larger companies, and some of the smaller ones as well, have so-called automatic or semi-automatic governors, or else employ the services of "a man at the valve" to regulate the pressure at the desired point; then, again, many managers of works make no attempt at pressure regulation, but permit the full pressure that comes from the weight of the holders to pass on into the street mains without hindrance.

Diversity of opinion, size of mains and services, and locality of works, furnish the source of nearly as many pressures as there are gas companies; and, consequently, the range of pressure at different plants varies from nine-tenths of an inch to the full pressure given by the holders. A uniformly low pressure can only be possible where mains, services, meters and house pipes are of reasonably ample size.

A pressure on the mains which is several times greater than required or used at the burner brings waste in leakage to the gas company, and forms the source of many complaints. Even though the pressure should be put on full during the heaviest consumption, say from sunset to midnight, yet during the remainder of the 24 hours it might be reduced, and thus save a large portion of the leakage. The expense attendant upon continually watching the pressure can be obviated by the use of an automatic governor, or one which, when set to give the requisite pressure for minimum consumption in clear weather, in the daytime, and the requisite pressure for maximum consumption at night, will automatically meet the varied demands between these points, and supply the requisite amount of gas.

There are elements which may disturb the initial pressure at the works, among which are—1st, the varying weights caused by coupling or uncoupling of telescopic holders; 2d, changing from single-lift holders of different sizes and weights; 3d, the varying weights of holders through being nearly submerged, or entirely inflated; and 4th, friction in the passage of the gas from the holders to the valve or governor house.

A change in initial pressure affects the resultant pressure in the proportion that the initial pressure bears to the resultant. If the flow is regulated by a fixed valve, the lowering of the initial pressure would lower the resultant pressure; but if regulated by a semi-automatic governor the resultant pressure would be increased in the same proportion, and would not recover its position; but if regulated by an automatic governor it would very soon recover its position.

In towns or cities where the main consuming district is above the works there are variations in the pressure, after the gas has passed the valve or governor, that are not contingent on the amount of gas being consumed. These variations have not heretofore been controlled or regulated by a governor, and cannot be checked by an attendant, unless he possesses a knowledge of the pressure in the district where the gas is consumed. The causes of these variations are—1st, the change in atmospheric pressure; 2d, change in the temperature of gas passing into the street main; and 3d, change in the temperature of the air.

1st. The variation in atmospheric pressure is annually about 1.3 inches, which would offset the pressure about one one-hundredth of an inch in our gas consuming district, which is 46 feet above the valve or governor house.

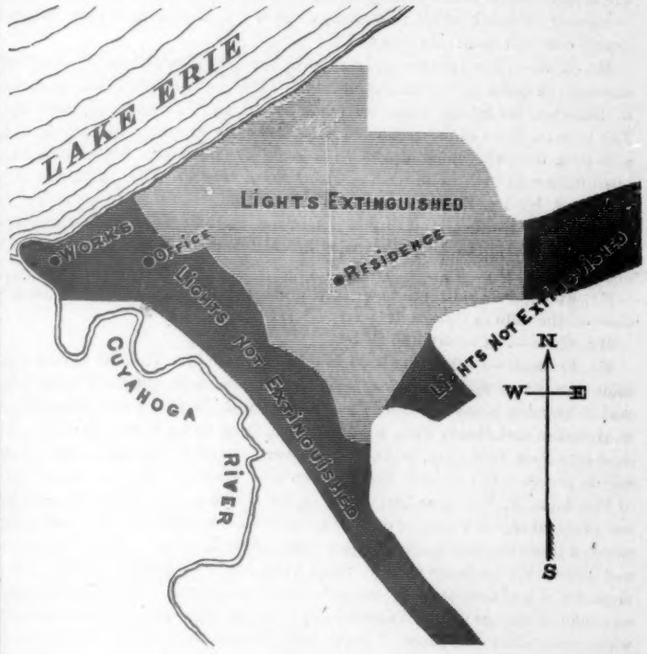
2d. The variation in temperature of the gas that flows into the street main is about 30° F. annually. The effect on our pressure from this change of temperature would be two one-hundredths of an inch.

3d. The variation in the temperature of the air is about 110° F.; this will affect our pressure 19 one-hundredths of an inch.

The two first-mentioned variations are of small account; but the fact that they exist should be recognized. The last is of greater importance, and an automatic governor could be so constructed as to correct this variation.

There are variations in pressure caused by the wind, which may occur anywhere or at any time. These are or may be much greater than those caused by the change in temperature of the air. Before describing the effect of the wind I wish to state that our works are located at the westerly end of our gas consuming district. Lake Erie is the northwesterly boundary, and its shore extends from the works in a northeasterly direction.

The Cuyahoga river valley is the southwesterly boundary, and extends in a southeasterly direction from the works. The gas works are near the point from which these two lines diverge. Winds blowing from points between northwest and southwest would blow from the works toward the gas consuming district; and would, when blowing from points between northeast and southeast, blow from the same district towards the works. Winds blowing from the north or south would be athwart the aforementioned directions. I will also mention that the office of the company is two-thirds of a mile distant from the works, and my residence is two and two-thirds miles from the same starting point—both in an easterly direction. I have observed, first, that a northwesterly wind blowing at the rate of 20 to 25 miles per hour raised the pressure at the office one-tenth of an inch, and at my residence 1¼-tenths. 2d, that a west wind, blowing at the rate of 20 to 25 miles per hour, has raised the pressure at the office one-tenth of an inch, and two-tenths at my residence; 3d, that a northeast wind, blowing at the rate of 20 miles per hour, lowered the pressure at the office one-twentieth of an inch, and raised it 1¼-tenths at my residence; 4th, that a southeast wind, blowing at the rate of 15 miles per hour, lowered the pressure one-twentieth of an inch at the office, with the same result at my residence. I might mention other observations, but these are amply sufficient to illustrate the general effect of the wind currents,



although I might further say that during the time of noting the aforementioned observations the pressure at the works remained unchanged.

Besides the ordinary disturbance of pressure caused by the wind which I have just noticed, I wish to refer to two unusual occurrences when, during their happening, the lights in the city were extinguished. The first of these disturbances happened some years ago, and the effect of the same was such as to put out nearly all the house and street lights in that portion of the city of Cleveland lying between Euclid avenue and Gordon street, and between Perry and Fairmount streets, or in a section of territory one-half mile in width and three miles in length. The pressure register at my residence, which is located within this territory, showed a sudden fall, followed by an immediate recovery of equilibrium. The same result was indicated on the register at the office, but to a less extent.

The second violent disturbance occurred on the third day of last April. The wind blew very strongly from the north shortly after one o'clock, A.M.; but at about 4 o'clock A.M. there was a sudden extinguishing of most of the house and street lights in a large portion of the city lying easterly of Morrison street, northerly of Woodland avenue, and westerly of Lincoln avenue, and extending to the Lake shore. The pressure registers showed that between the hours of 3:30 and 6:30 A.M. the ordinary pressure conditions had been greatly disturbed. At the works the oscillations were shown to have been as violent as four-tenths of an inch; at the office fourteen-tenths; and

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at my residence they went up to 21-tenths. Between 1 and 3:30 o'clock A.M. the pressure at the office remained at the usual point; but at my residence it was 1½-tenths higher than usual.

Noting the comparatively small fluctuation at the works, as between the large ones at the office and at my residence, I sought to determine whether the disturbing cause was at or away from the works, and so I applied force to the float of the governor, and caused a fluctuation in the pressure of four-tenths of an inch. The office register showed a fluctuation of four-tenths, and at my residence the fluctuation reached to 4½-tenths. It would appear from this test that the disturbance above mentioned must have been caused by the wind, and was quite independent of anything that had transpired at the works.

The practical result of my experience is that to give uniform satisfaction to consumers, and yet do full justice to the interests of the company, a lower pressure should be kept on our street mains, both day and night, than is now maintained by many managers of gas companies; and those late investigations on the disturbance of pressure indicate that in a place having its gas consuming district very many feet above the valve house, provision should be made at the works for changing the pressure, either automatically or otherwise, to counteract the effect of the fluctuation in the temperature of the gas and air; and also that in every place the effect of a continued violent wind should be noted, and the pressure at the works so changed as to correct it.

Discussion.

Mr. Fullagar—I would like to ask Mr. Hyde a question. In looking at the map it seems to me that right where the greatest disturbance was noted as having occurred (at his residence) there is "dead-ending" main running nearly east and west. Is that so?

Mr. Hyde—(The speaker had a map before him illustrating the sizes and direction of mains in the district affected. The main conduit was 24 inches in diameter, the lateral branches being 20, 16, and 12 inches, respectively.) The pipe in front of my residence is 12 inches in diameter, and is fed from a 16-inch conduit, which draws from a 20-inch main, the latter being supplied from a 24-inch main leading direct from works. The particular pipe spoken of by Mr. Fullagar does not end "dead." In fact, so far as the mains are concerned, you cannot determine therefrom any reason why one portion of the lights in that district should be affected while the others remained lighted.

Mr. Fullagar—Had there been any great electrical atmospheric disturbance on the date in question?

Mr. Hyde—Not to my knowledge.

Mr. Fullagar—I asked the last question because Mr. Thomas stated that some six years ago an atmospheric disturbance took place—I believe he said its starting point was traced to Newark, N. J., from whence it moved on to Hoboken and Jersey City, in same State, then crossed the Hudson river over into New York City, and on again over (or under) the East river, making its presence felt in both the Eastern and Western districts of the city of Brooklyn, N. Y.—at an early hour of the morning, by which a great number of street lights were put out. The holders, according to the best judgment of those engineers whose lights were affected, rose between 18 inches and 2 feet; the pressure in valve room went down to nothing, and in a few moments it had increased to an inch above maximum. Mr. Thomas, who was then in charge of the Williamsburgh (Brooklyn) works, can state exactly what occurred at that time. I think Mr. Thomas ascribed the occurrence to an electrical or other atmospheric disturbance.

Mr. J. R. Thomas—On the night that this disturbance occurred a good many of our street lights were put out, and we were at a loss to account for the trouble. You know that gas men usually tell their neighboring brethren about their troubles; but on that particular occasion we held back, with the idea of hearing if anybody else in our vicinity had been similarly affected. We did not have to wait long until the Superintendent of the Citizens works, located at the other end of our city, or in South Brooklyn, reported that a very great number of his street lamps had been put out from some unknown cause. Comparison of date and hour made it apparent that his experience was also our experience. Next, and, in short order, we heard from Mr. Eugene Vanderpool, of the Newark Gas Light Company, that a similar visitation had befallen his street lights; then came a like story from Mr. C. V. Smith, of the Manhattan Company of New York city. The managers of other works in the five cities named also confessed that their lights had been attacked. The street lights extinguished on our lines of mains would average, I suppose, from ten to forty feet above the level of the gas works. In some of the low places they were not put out. This all happened, as near as I can recollect now, at about 2 o'clock in the morning; and the disturbance sounded a good deal like that which would be made by a large flock of strong-winged birds in their flight through the air. The atmospheric pressure was taken entirely off of the gasholders, and they rose with startling suddenness. The pressure gauge sheet showed a most peculiar mark. The pressure was over the normal one by 4½ tenths. In our subsequent investigations of the matter we found, from observations made at the Central Park Observatory, in New York city, that the barometer had fallen over an inch at the time our lights had been extinguished. There is no doubt in my mind that the putting out of the lights was caused by the removal of pressure from the gasholder, and not as a result of pressure added to it. I believe this from the simple reason that as soon as the atmosphere had regulated itself again the normal or usual gas pressure was restored. In our city we have a large number of consumers who are accustomed to burn gas all through the night; and between the hours of 2 A.M. and daylight we were kept pretty busily engaged in arousing consumers to make investigation as to whether their lights had been extinguished or not. In some localities plenty of them had been put out; in other situations they had not been affected. The lights in my own house were not disturbed in the slightest. The mains could have had nothing to do with it, for on the street where the greatest number of extinguishments were reported the distributing conduit was of large diameter, and not within three miles of a "dead end." The same thing occurred with Mr. Vanderpool at Newark; and it was a very singular circumstance in his case that the lights on one side of a street—for about a mile of its length—were all put out, while those on the other side kept on about their proper duty. In talking the thing over we could account for it in no other way than on the theory that during an atmospheric disturbance the pressure had suddenly been entirely taken off from the gasholder, and that the holder instead of falling had risen. I forget the exact time of the occurrence,* but think it was five or six years ago. We have had winds blowing at the rate of some 45 miles per hour; but at such times the pressure of our gas, after being delivered from the governor, has never varied the one tenth part of an inch.

Mr. Walter Clark—About five years ago we had a similar experience at the New Orleans (La.) works. We had six holders, placed pretty close together; and without warning or apparent cause one afternoon three out of the six rose about one foot, and then dropped back again. The remaining holders, which were in work (the affected ones were not at work) were not affected in the least. The water dashed up some six our eight feet out of the tanks. We could detect no atmospheric disturbance; there was no high wind blowing; the barometer was not affected—that is, there was no report of any atmospheric vagary as shown by the barometer. What the cause was is as yet a riddle, and is likely to remain so. There was nothing unusual reported as having occurred on that day by the Signal Service men. The holders moved around in such fashion that the men ran away from them in fear. There was of course no effect exerted on the street mains, as the holders that were in work were not affected. One holder that was affected was so close to one not affected that you could throw a stone from one to the other. I want to ask Mr. Hyde if anything unusual was noticed at the gas works when this disturbance took place.

Mr. Hyde—I was about to say that a few days ago, when trying to find out whether the disturbance spoken of was noticed either up in the city or at the works, I went to the governor, placed my hand on its plate, and oscillated it until the vibrations were two-tenths up and one-tenth down—or caused a disturbance equal to four-tenths. I say in my paper that the oscillation was four-tenths at the works, fourteen-tenths at the office, and four-tenths at my house. In the experimental disturbance of the governor to the extent of four-tenths of an inch, the marks on the pressure gauge showed just as they did during the actual disturbance of the 3d of April. Now, judging from the experiment, it could not be possible that the disturbing cause was at the works; and it is plain enough that the disturbance at the works was but the sequence or result of a disturbance away from the works. The disturbance must have taken place right through here. (Referring to map and pointing out the light shaded portion represented in cut.) The lights extinguished were all in the same territory as that in which my house is situated, and the oscillations or vibrations which were noticed afterwards would seem to indicate that the disturbance was in some way connected with wind passing over this portion of the city. I am sure that the gasholder was in no way, shape, or manner concerned in the affair—no more than if it had not been in the city at all. It must be that the tornado action of the wind on the gas sucked it up, or pressed it out in some way. I can give no real satisfactory explanation of the case. These are the facts, though. Here are the lights that were left burning; here are those that were put out; and here are gauges which show just what the effect was.

Mr. Thomas—There is one other thing that I might have mentioned in connection with that mysterious visitation of some years ago. The Manhattan Company's system of distribution is to work out the gas with valves; and at the time of the occurrence of this atmospheric disturbance before the men could get to the valves the whole thing had transpired. In regard to the operation of wind upon gas where there is a governor regulating the flow, as increasing pressure, I am able to speak from some experience with reference to that. Right opposite the Williamsburgh gas works

* The disturbance occurred on the night of April 16, 1880. For an account of same see JOURNAL for June 16, 1880—Vol. XXXII., p. 206.

is a large oil refinery, fitted with quite a number of agitators; the owners of the oil works have always insisted that agitators will never explode, but my faith in their veracity (and if for no other reason) was sadly shaken when I beheld one of them in the very act of exploding. The exploded agitator was separated from one of our holders by probably 80 feet—just on the other side of a narrow street. The force of the explosion was so great that it drove the gasholder down in the tank for a distance of 7 feet, and threw water out of the tank up to a distance of 17 feet upon the columns. For a minute or so the pressure in the valve house was changed, the variations being between one and two tenths. No street nor consumer's lights were affected. The water went down and came up in the tank with a bound; and this tide-like condition of affairs lasted, I suppose, during two or three minutes.

Mr. E. J. King—With regard to the theory of tornado action, perhaps an incident in my experience may be pertinent thereto. I live in what may be designated as a tornado district; for although one of these devastators has never visited our city proper, they have made their appearance within a few miles to the north and south of us. To show how eccentric the action of a tornado may be, I will state the following: Right by the side of an ordinary three-barred rail fence a stiff hedge had been planted, with the idea that by the time the fence was worn out the hedge would be fit to take its place. The tornado came along, and that hedge was mowed down as nicely as if it had been done with a scythe—not a vestige of it was left; while not even a rail had been taken from the fence. I might also say that in the same place, and during the same disturbance, a small house stood in the path of the wrecker. It approached the rear of the house, jumped over the roof, and took off the front porch. Otherwise the dwelling was unharmed. There were many other instances of a curious kind; but that of the hedge and fence seems to me as somewhat analogous to the case spoken of by Mr. Thomas, where on one side of the street the lights were left burning, while those on the other side were extinguished.

Mr. Hyde—A gentleman in Cleveland told me of the following singular affair which occurred on the other side of the Cuyahoga river: One of the houses there had a chimney on either side; forty feet from rear of house was located a privy, and between privy and house there was a pile of straw. The point of the tornado in its sweep downward took off the chimney to left side of building, turned aside, struck the ground, and smashed the privy into splinters—there actually was not a single trace of it left; and yet the pile of straw, over which the tornado had to jump to reach the privy, showed no evidence of having been disturbed. I do not believe a blade of it was disarranged. The only damage done to the house building was the cutting off of the one chimney.

Mr. King—Speaking of tornadoes, I know of a very peculiar case that happened in Missouri. The case has been reported to the Signal Service authorities at Washington; and I have positive assurance that it was an actual occurrence. A man living in the western part of that State prepared a few sides of beef (it was certainly in a good state of preservation) and hung it to be cured in his smoke house; a tornado struck that smoke house shortly after the beef had been consigned to its care; the meat was carried down into a ravine, and then rolled up a hill on the other side, where it was left high and dry, owing to the storm having "sought pastures green and fields anew." Twelve hours afterward the owner of the beef discovered its position, and it was found to be perfectly alive with maggots; but where they came from, or what occasioned them, was the mystery.

Mr. James Somerville—I will suggest that after these explanations there is no difficulty whatever in understanding why Mr. Hyde's lights were put out; they were simply, for a time, in a vacuum. If a vacuum will demolish a privy building in the free and easy style described above, the vacuum may be depended upon to put out street lights. Mr. Hyde states that while lights continued to burn on one side of the street they were put out on the other side. On the one side of the roadway they were simply burning in a vacuum; then the pressure was taken away and the lights went out.

Mr. Hyde—I might say that on the occasion of the first extinguishment a very severe gale had passed over that part of the city.

Prof. S. H. Douglas—It appears to have become rather general practice to account for any unusual atmospheric disturbance on the ground that electricity is at the bottom of it. I have at various times received a great many letters upon this subject, and was thus often appealed to because many knew that I had devoted considerable attention to the study of electricity, and have also given some thought to the subject of atmospheric disturbances. I have received inquiries in regard to just such phenomena as those now under discussion; and nine out of ten of the inquirers would seek to have the disturbances explained upon the electrical theory, and it would seem as though this basis of explanation is resorted to because the phenomena can be attributed to no better source. They attribute it to electricity simply because they have nothing else to assign it to. Now, it strikes me that these vagaries are assignable to a much simpler source—nothing other than sudden variations in atmospheric pressure. Had the condition of the barometer been carefully observed at about the time that these extinctions occurred, there can be little doubt but that a sudden rise in its registration would have been perceived. I cannot see that any other rational explanation can be made. That such rise was not observed at the nearest Signal Service station does not prove anything, as evidently the disturbances took place over but a very limited district. Look at the very small section or district that was affected in the large city of Cleveland, as reported by Mr. Hyde. There the lights that were extinguished were not far from the works, and yet the barometer at the works was not affected. That shows conclusively how limited was the field over which the disturbance extended. I would like Mr. Hyde to tell us as to whether his automatic pressure gauge indicated any unusual disturbance. I think it must have indicated something unusual. I think the rise and fall of holder alluded to can be attributed to nothing else but variations in atmospheric pressure; and, in short, that all these disturbances are beyond the influence of the atmosphere except as they influence the holder itself. Now that I am speaking I will allude to one other fact that I observed when Mr. Hyde was reading his paper. He carefully refrained from making any specific allusion to his automatic governor. I wish to say that Mr. Hyde has invented a governor; and you will recollect the drawings which he presented to the Association at our meeting of a year ago. After having given a very careful study to the drawings that were then presented, I ordered one of Mr. Hyde's governors, and the instrument was put in last fall. I think it but due to him to state to the Association that that governor, so far as I have been able to discover, is a model of perfection. It is perfectly automatic. From early last fall, or when it was put in, I have not touched it. It has worked constantly, giving me a day pressure of about 1½ inches, and a night pressure of about 3 inches. It takes care of itself. When the evening consumption commences the pressure runs up (without any attention whatever, or any change of weight) to night pressure, and there continues until the lights are turned off. That it has done day in and day out for six months. I have not touched the register at all, nor in any way interfered with it; and it has never failed to work to perfection. I say this in justice to Mr. Hyde, since it appears to me that he was a trifle too modest in failing to make any allusion to the efficiency of his instrument.

Mr. Hyde—I am grateful to Prof. Douglas for complimenting the governor that myself and son have devised, but I may say that I am not here to advocate the merits of any particular instrument. I did speak indirectly about the necessity of having an automatic governor. That, I think, cannot be gainsaid. If you have a governor that is really automatic in its action you get something which does work that a man cannot do, and it is a really valuable addition to the plant of any gas works.

On motion of Mr. Ramsdell the thanks of the Association were tendered to Mr. Hyde for his instructive paper.

The Question Box.

Mr. King—Before reading the next paper I would like to ask if the Chairman's suggestion with regard to the question box has been followed out; and what portion of our time is to be devoted to a consideration of its contents?

The President—That will be for the Association to determine. The box is here, and I hope the members will use it; and I would particularly desire that those of our friends who are too modest to "speak out in meeting" will avail themselves of its presence to ask questions concerning matters in which they are especially interested. The questions need not necessarily relate to any one of the papers that have been read, but may be submitted in reference to any matter or topic allied to the gas industry.

Mr. John Fullagar—Mr. Chairman, I noticed another suggestion made in your address which seems to me worthy of our attention and action. You suggested that members of the smaller companies should take a more active part in the discussions at our meetings. These members, so far at least, have paid no attention to that intimation. At the meeting of our Ohio Association the members representing the smaller works were most active in the debates; they did about all the talking, and the talking was well done. Some of those who were present at that meeting are with us here at this gathering, and they have failed as yet to say one word. I think it is time for them to get up and say something. These meetings are of far more importance to the managers of small than of large plants—not that I would wish to be understood as detracting in the slightest from their value to the managers of the latter, either. Let the first-named mention their difficulties—provided they have any—and ask for advice.

The President—We must naturally conclude from their silence that they have got their works in such nice shape that they do not need to ask questions. I am, of course, greatly in favor of hearing the experience of every member. I expect that no one present will be backward in giving his own experience, and that those who wish for advice will freely call for the assistance needed. The reading of papers will now be resumed.

Mr. J. W. Dunbar, of New Albany, Ind., then read the following paper on the subject of—

THE UTILIZATION OF WASTE HEAT FROM THE BENCHES.

The gas plant with which I am connected as Superintendent has in use benches of "threes," and also employs a Salter steam-jet for the removal of gas from the hydraulic main. With benches of "threes" a greater percentage of coke is, of course, consumed in the carbonization of a given weight of coal than is the case where benches of "sixes" are run, or where regenerative furnaces are used. This greater percentage of coke required is occasioned by one or both of two things—viz., improper combustion of coke or of the gases generated from it; or from a loss of heat which has not been properly applied or utilized before it is passed out of the bench. With us at New Albany I am aware that the defect of waste heat has been prominent, and this prominence is undoubtedly a cause or reason that our coke percentage charged against carbonizing account was greater than it should have been.

The upright boiler which supplies our steam-jet and heats up the purifying room was, previous to December, 1884, heated with coke as fuel. The amount of coke used for 11½ months of 1884 was 3,400 bushels; which, at 9 cents per bushel—price received by us for coke in yard—amounted in value to $306. This sum is now saved to the company, since we use no coke fuel under the boiler, but instead utilize the waste heat from benches to perform the required work.

This boiler is situated at a distance of about 25 feet from the rear or back of stack of benches from which we derive our waste heat. The plan pursued was this: A flue was constructed at end and bottom of stack of benches; it ran up along the end to top, where it was connected so that it might, if required, be arranged to receive the waste heat from all of the benches. From the bottom of this flue, and connecting with it, a second flue was built, running underground to the boiler—the flue being 18 by 12 inches; it entered the boiler under the brick foundation. The heat thus passes up on inside and out of stack to boiler.

The waste heat from one and one-half benches (as our boiler is now placed) will make 40 pounds of steam, or sufficient to remove pressure of gas made with three benches of "threes" from the hydraulic main, and also heat our purifying room. This arrangement still leaves one and one-half benches from which the waste heat is not utilized. The steam-jet under above arrangement requires little or no attention; the gauge shows zero all the time, and the amount of steam remains about constant.

As an evidence that the utilization of waste heat has not interfered with the draught, I will state that with the same number of retorts we have made 500 cubic feet per mouthpiece per diem more during the five months since the change was made than was the case in the five months preceding the change—our average yield for the last five months, with retorts 14 in. by 22 in. by 8 ft. 6 in., being 6,850 cubic feet per diem per mouthpiece. Forty per cent. of the coke made is required in the burning off of the charges. This large percentage of coke used in carbonization is accounted for on the ground that the furnaces are rather badly burned out, the benches from which the results are reported having been in use from 19 to 22 months.

When more steam is required in a gas works than that taken up in the mere running of a steam-jet and the heating of a single room, then by placing the boiler alongside of or close up to the end benches a much greater quantity of steam can be generated, as much heat is no doubt lost in passing through the underground flue for a distance of 25 feet. I expect to move my boiler and place it so that I can obtain enough steam to run a coke crusher recently purchased by us. This will require the diversion of more waste heat to generate the needed increase of steam power; but I am confident that by proper arrangement of dampers to flues the requisite amount of heat may be turned under the boiler.

In the prevention (or rather the utilization) of waste heat, we who run benches of threes and employ as much as 40 per cent. of our coke in keeping up the heats have a problem before us that I think we can with profit experiment upon. I am confident that by having our boilers in proper position, but one-quarter of the waste heat would be necessary where one-half of it is now required. As near as I can estimate, our coke consumption is reduced 5 per cent. (on whole amount made) through utilizing one-half of this waste heat; but with the boiler in proper position I am confident that one-quarter of the waste heat would do the heating required; and if this be the case it seems to prove that from 20 per cent. of coke burnt in our furnaces we get no return, or that one-fifth of the fuel absolutely passes off in the shape of waste heat. If we have need of this heat that is now wasted, the point for us to determine is how to economically prevent its passing off before it has rendered us due service in our benches. I think that to some extent this can be accomplished by using larger retorts with same size furnace; or by reducing width of furnace when using retorts of ordinary size. The furnace should also be placed as near the floor as possible, so as to give the heating gases a longer travel upward before they come in contact with the retorts.

Discussion.

The President—Here is something practical for your consideration. I hope that many of you will take part in the discussion.

Mr. James Somerville—I would like to ask Mr. Dunbar if he can tell us what is the temperature of the waste heat as it issues from the bench.

Mr. Dunbar—No, sir; I had not determined that.

Mr. Somerville—I think if a furnace is properly constructed, and the heat be made to do its duty, the waste heat will not be of much account. That is my idea; but of course there are furnaces where the waste heat is enormous, and where it might be utilized in the way Mr. Dunbar indicates. I would be rather inclined to work on the principle that there is no waste heat—that the heat has done its duty, and that it is carbonic acid gas and not carbonic oxide that issues from the flues.

Mr. E. McMillin—This is one of the best papers we have had read here to-day, and I would like to see more interest shown in it in this discussion. It is one of the matters that superintendents of small gas works might discuss with profit. If they could get a 25 per cent. increase to their salaries they would all like it; and now each company could afford to give a superintendent 25 per cent. increase to do what this gentlemen (Mr. Dunbar) has done. The average pay of a superintendent in this country is probably not more than $1,200 per year. This gentleman says he has saved more than $300. That is a big item. I think there is an abundance of heat that goes to waste in every gas works. If you have a regenerator furnace you may utilize it to great advantage; but not one in a hundred of the smaller gas works in this country has a regenerator furnace. I doubt if you will find any of them passing their waste gases off at less than 900° or 1,200°. You can utilize at least 400° or 500° of that, and still have sufficient temperature to give a good draught—if you have any stack at all. I am now figuring on the amount of waste heat in our works, where we use 15,000 bushels of coke every quarter; and that, too, where we have regenerator furnaces. The gases pass off, after we have utilized them to the greatest possible extent in our regenerator furnaces, at more than 700°.

The President—I think this is a matter of very great importance indeed to the smaller works throughout the country.

Mr. Harry E. Clarke—We had a boiler set in our stack that was heated with the waste gases. We had enough heat there to burn the bottom out of that boiler. We made steam for several months, but the boiler was set so close to the stack that even when we turned the waste heat away from it we could not cool it sufficiently to put a man in to scrape it. The result was that the bottom of the boiler burned out.

On motion of Mr. Howard, a vote of thanks was given to Mr. Dunbar for his interesting paper.

The President then introduced Mr. E. H. Jenkins, of Columbus, Ga., who read the following paper, entitled—

IRON PURIFYING MATERIAL.

In presenting this paper, I am well aware that some of the members present have used an iron material for purifying, with equally as good, perhaps better, results as those which I will here present; but I am also certain that others do not use it, and if I can give them a "dot" that may be of benefit to them, I shall feel amply repaid for any effort I may have made.

Some three years ago I called upon Mr. Thomas Smith, of the Grand Rapids (Mich.) Gas Light Company, and was shown by him a purifying mixture that he was using in lieu of lime. He kindly furnished me with the formula used in preparing the same; and I have since used this mixture with such good success that I have been induced to give some of the results. During the past year we have used it exclusively in the Columbus (Ga.) gas works.

I found upon looking over the book that the lime for the previous year had cost $429.25. The entire cost of the iron borings, copperas, sawdust, etc., required to fill the four purifiers was a little less than $25. My purifiers are 6 ft. by 6 ft. and 2½ ft. deep. We use an upper layer of lime to take out the carbonic acid. The total cost of our purification for the past year has been but $72.50, or about three-quarters of a cent per thousand cubic feet of gas—a saving of $356.75 over the purification expense of the previous year.

The material is doing better service now than when first put in work. The average amount of gas purified during the first three months was 245,000 cubic feet per purifier; for the last three months it was 268,000 cubic feet per purifier, and the material has increased in bulk by about 12½ per cent. The saving in labor is quite an item. In the winter months, under the lime process, it required about fifteen changes of purifiers per month; under the iron process we have only had one month that has had more than four changes, and that was in January—a purifier being changed on the 1st day of the month and another on the 27th, making five changes that month.

In using the material we put on the lower screens or trays, and fill the purifier as full as we can up to the top trays. We sprinkle the iron material with water as we put it into the purifier, so as to make it damp, but not wet enough to cake or get hard. We then put on the upper screens, and put about three inches of slaked and screened lime upon them.

We have not had a single complaint of foul gas, nor the least bit of trouble

from back pressure or otherwise, from the use of this material, and it has given perfect satisfaction.

We use native Alabama coal, which is a lighter grade of coal than Pittsburgh; it is something similar to the Western coals, but somewhat richer.

I will say, as to the materials used, that I shall be very glad (presupposing that Mr. Smith will offer no objection) to answer any questions.

Discussion.

Mr. Smith—Mr. Jenkins knew whereof he spoke.

The President—What quantity of gas did you purify per bushel of lime when using the latter, or in the year selected to make the comparison between lime and iron?

Mr. Jenkins—I am not prepared to say with regard to that, since it was the year just previous to my taking charge of the works.

The President—Do you know what the relative cost per thousand was?

Mr. Jenkins—The lime purification cost four cents per thousand that year, and the iron and lime purification this year cost three-quarters of one cent per thousand.

The President—What did the lime cost per bushel?

Mr. Jenkins—Sixty cents. My friend Starr says that lime down there costs as much as wood. Even if the lime could be had at 15 or 20 cents per bushel, or less, I think, all things considered, iron is the best purifying material that can be used—for small works especially.

The President—Are there any other members here who are using iron purification? If so, we would like to hear their experience with it.

A Member—I would like to ask Mr. Jenkins this question: Suppose he had charge of a plant where the boxes were too small for the work exacted from them; would he then prefer iron to lime?

Mr. Jenkins—If you can possibly use the iron sponge I would advise you to do it. Even where your purifiers are very small you have to depend upon a certain number of layers of lime. This sponge you can put in the full depth of your purifiers; it can be revivified in three days, and then you may add more of the iron material if you wish. I think there are very few works where the purifiers are so small that iron cannot be used; and, indeed, I have doubt as to whether a locality exists in which iron purification will not be found advantageous. We put about 40 bushels into a box that is 6 feet by 6 feet.

A Member—What is the effect of the heating of the oxide when the cover is taken off the box?

Mr. Jenkins—When signs of heating are developed we "turn the material out" from the boxes and allow it to lie on a platform built for the purpose. After a day or two we turn it over, and might repeat the last performance again.

Mr. Smith—I will say that for 19 years I used lime in purification. Nine years ago I tried the oxide, and so well satisfied with it did I become that I have kept on with it ever since. A saving of between $1,500 and $1,600 per annum has accrued to us in the change from lime to oxide of iron purification. As you will have learned from Mr. Jenkins's paper, his system, or material, and mine are identical. We have never had any trouble with it. Perhaps a trifle more ammonia came up in the second purifier; but I have never found any carbonic acid in our gas.

Mr. Jenkins—You use lime also?

Mr. Smith—Yes, we use some lime with it; but the quantity is trifling.

Mr. G. A. Hyde, Sr.—I have had some experience with oxide of iron in purification. We purchased a quantity of it from Prof. Douglas. It was recommended quite highly to me by another gentleman, and I thought we would give it a trial. So far I am more than pleased with it; indeed, I am delighted with that manner of purification. So far we have purified nearly 60,000 cubic feet to the bushel. I cannot see at prezent that there is any deterioration in the efficiency of its purifying qualities. We can take it out and revivify it easily; in three days it can be put back again if necessary. We do not change the box oftener than once in ten days. As near as I can determine, it purifies 11,700 feet at each run. Besides the 50 bushels of oxide in each box I use about three inches of slaked lime; but, taking this material at 50 cents per bushel in our yard, it has demonstrated to me that it has great economy over lime. Indeed, as far as I am concerned, I have no desire to use anything else.

A Member—Does Mr. Jenkins use any lime at all? If not, does not the carbonic acid left in the gas affect the illuminating power?

Mr. Jenkins—As said, we do use some lime. I have tried it both ways. Without any lime there is a shrinkage of at least one candle in the illuminating value of the gas. We only use one thin layer of lime. The proper way to use this material is to have an auxiliary lime purifier. That lime purifier need be charged but once in six months; but being cramped for room at Columbus, we use a three-inch layer of lime on the upper tray.

Mr. McMillin—If one who uses iron thinks it best to use lime also, let him keep the lime as "sweet" as possible. It does not hurt it to take out carbonic acid; and it will take out bisulphide of carbon. He will not get that at all if he uses lime with iron purification.

Mr. Starr—I think there need not be any trouble from admixture through the use of lime and oxide in the same box. I use iron sponge and lime in the one box, and by making the iron the lower layer, with the lime on top, and separating them with coarse burlap cloth, I save the iron sponge completely. Before trying the burlap plan I would lose from four to five bushels.

Mr. Jenkins—We have a light iron screen, punched with a large number of quarter-inch holes; and very little lime comes through such divisions. Instead of lime being hurtful to the sponge, we find it an advantage to put some lime in the material when making up.

The President—I had a very interesting experience last year while making some tests in purification. A gentleman who is here present had been experimenting on the subject of attempting to revivify the sponge while it remained in the purifiers, thus seeking to do away with the expense of handling it oftener than was absolutely necessary. His experiments were not very successful, as the sponge operated upon had been mixed with sawdust. I then determined that I would make a test of a material (intended to replace the sawdust) that would not catch fire, and here was the result: I took broken and ground up fire brick, mixed fouled iron sponge with it, put the mixture on a heavy wire purifier screen, and put the fans at work reviving it. In a box 25 feet square, filled with a 20-inch depth of material, I found, on the first trial, revivification was effected in seven hours. I kept a thermometer inserted through opening in the lid, and you may be sure I watched it closely. The second trial showed a revivification in five hours; the third and fourth trials being accomplished in time equal to that of the second. About the time I was ready for the fifth experiment I was unexpectedly summoned East, and so I selected the man whom I thought was best fitted to attend to the case while I was away from home. He thought he could beat that five hours record, and started in to do it. About the first reading he made of his thermometer he managed to break it. He let his fan run on during the time that his assistant was hunting for another temperature registerer. Before the assistant had been gone 15 minutes our hero began to think there was quite a lively heat in the box, and he was right. He whipped off the cover, and discovered that the iron had melted and formed into chunks as big as his head. The hose was turned on, and they had exciting times quenching the stuff. When I returned the material was piled up out in the yard. It had been lying there for two weeks, but it was no longer oxide of iron. I find from 450° to 500° of heat is as high as one should ever go; for beyond that you drive off the oxygen, and change your material from sulphate to sulphide.

On motion of Mr. Hyde, the thanks of the Association were given to Mr. Jenkins.

[To be continued.]

[Official Report.]

Sixth Annual Meeting of the Central New York Gas Engineers Association.

Held at Syracuse, N. Y., Thursday, May 21, 1885.

The Sixth Annual meeting of the Central New York Gas Engineers Association was held at office of works of the Syracuse Gas Light Company, at 10:30 A.M., Thursday, May 21st, 1885. The following gentlemen were in attendance:

Avery, A. J., Dunkirk.	Babcock, H. N., Syracuse.
Cartwright, W., Oswego.	Down, W. H., New York city.
Gribbel, J., New York city.	Harbison, J. P., Hartford, Conn.
Humphreys, W., Dansville.	Hequembourg, C. E., Bradford, Pa.
Kingsbury, F. D., Corning.	McDougall, A., Hornellsville.
North, L. C., Canandaigua.	North, G. C., Corning.
Perry, E. C., Dunkirk.	Rider, Geo., Norwich.
Scrafford, W. H., Bath.	Truesdell, C., Cortland.
Tufts, J. H., Syracuse.	Wood, A. C., Syracuse.

Routine Business.

In consequence of illness the President, Mr. John McDougall, Hornellsville, was an absentee. Mr. Wood called the gentlemen to order, and after stating why the chairman failed to attend, moved that Mr. A. J. Avery, of Dunkirk, act as Chairman *pro tem.* The motion was carried. Mr. Wood then notified the Chair that Messrs. W. H. Down, of New York city, and J. P. Harbison, of Hartford, Conn., were present, and moved that the privileges of the floor and the courtesies of the Association be extended to the visitors. This was agreed to. In formally announcing the action taken the Chairman said he was glad to welcome the gentlemen, and hoped they would join in the discussions with perfect freedom. In making their acknowledgments Messrs. Down and Harbison thanked the Association for the kindly courtesy shown them. Mr. Harbison assured the Chairman that he would gladly take part in the discussions.

A reading of the minutes of last annual meeting was dispensed with, and

the same, as published in the AMERICAN GAS LIGHT JOURNAL, were approved as printed. A letter to the Secretary, from Mr. W. T. Allison, Librarian of Patent Office, London, England, was read, and Secretary Babcock was instructed to make suitable reply thereto. Secretary and Treasurer's annual report for year was then read. The figures showed that receipts exceeded expenditures. On motion the statement was accepted and filed.

The names of Messrs. W. H. Down, N. Y. city, A. McDougall, Hornellsville, C. Truesdell, and S. C. North, Cortland, and J. H. Tufts, Syracuse, were proposed for membership. On motion Mr. Rider cast the ballot of the Association for the election of the applicants. On motion the Secretary was instructed to cast a ballot re-electing the old board of officers to the positions held by them during the past year. The gentlemen thus chosen to succeed themselves are the following:

President—John McDougall.
First Vice-President—Wm. Cartwright.
Second Vice-President—Wm. Parrish.
Secretary and Treasurer—H. N. Babcock.
Executive Committee—J. H. Findlay, Wm. Humphreys, L. C. North, J. H. Case, Geo. Rider.

On motion a committee of three (Messrs. Hequembourg, Kingsbury, and Babcock) were appointed to select the place for holding next annual meeting; they were also instructed to assign to different members the task of preparing and presenting papers to next annual gathering.

ELECTING MR. HARBISON AN HONARY MEMBER.

On motion the members unanimously voted to elect John P. Harbison, of Hartford, Conn., to Honorary Membership in the Association. When the Hon. J. P. H. recovered from the surprise into which this unexpected action had thrown him, he arose and said:

Mr. President and Gentlemen:—I thank you most heartily for your highly complimentary action towards me, and confess my inability to, at such short notice, do justice in words to the extent of your courtesy. I have been much pleased to note the large proportion of those on your membership list who are in attendance, and the fact certainly vouches well for the interest shown in previous meetings. I am pleased to observe the earnestness with which you discuss and act upon the matters that are presented to your notice. Let me impress upon you how important these matters are—not only to yourselves and to your Association, but to the entire gas fraternity as well. I might dilate upon the high esteem in which those of you (and they are many) with whom I am acquainted are held, and I might also speak of the good record which your Association has made for itself, but time forbids. Gentlemen, let us bear in mind that we are all working for the attainment of one thing—a better light to be sold at a reduced price. It is this that will kill any and every competitor, and I can truthfully say, as the result of long experience, that I have gathered much benefit and assistance from assemblies of this character. Let our motto be: "High quality and low-priced gas." Once more I thank you for the honor shown, and allow me to close with the hope that I may often meet with you in the future, and believe me that I shall be always glad to see you at my home in "the Land of Steady Habits."

PROGRAMME OF THE SESSION.

Mr. Wood announced the following programme or order of business for the day for adoption: Business meeting up to 12 M.; adjourn for lunch; inspection of the new plant of the Syracuse Gas Light Company; reading of a paper on the construction and operation of the new plant, by Mr. A. C. Wood; final adjournment to 5 o'clock dinner at the Globe Hotel. [This dinner was given at the instance of Mr. Wood.] On motion of Mr. Cartwright the programme, as outlined by the proposer, was adopted.

A QUESTION-BOX.

On motion the Secretary was instructed to procure a question-box, and have the same placed in suitable and convenient position. He was also directed to inform the members that the question-box would be made a permanent feature in future meetings.

NATURAL GAS.

Mr. Hequembourg—Now, gentlemen, I suppose you are all aware that I have made statements at your previous meetings, and also presented and read a paper before the last annual meeting of the American Gas Light Association, on the subject of natural gas. I am a trifle afraid that some of these assertions have not been received with favor—in short, or to put the matter more plainly, their truth has been questioned. Since Mr. Harbison has recently been in Bradford, and has been investigating my statements, perhaps I might ask him to tell the gentlemen present what his impressions were regarding what he saw there, and what he now thinks about natural gas?

Mr. Harbison—During my recent visit to Bradford I tested the natural gas used there, and can fully confirm what Mr. Hequembourg has said in relation to it. Its abundance is astonishing. It is most satisfactory when employed for heating or cooking, as well as in mechanical operations. Used for illumination through the agency of a flat-flame burner, it is not so satisfactory, giving, under such circumstances, an unsteady and poor light of from 7 to 8-candle power, as shown by photometrical test carefully made. On the other hand, the same gas consumed through an Argand burner tested fully up to what has been claimed for it by our Bradford friend. According to my own experiments I learned that 6.2 cubic feet of the Bradford natural gas would yield a light of 27 *candles*. When consumed in a Siemens burner this gas gave the very best artificial illumination that I ever witnessed. In one of the drygoods shops of that city I beheld three Siemens burners consuming natural gas, and the large store was brilliantly lighted. Colors were brought out as clearly as they would be under sunlight, and tints could be plainly distinguished at a distance of from 25 to 30 feet away from the lamps.

Mr. Hequembourg—I feel under obligations to my friend Harbison for his courtesy in testing the Bradford gas, and am glad that his testimony confirms my prior statements in regard to it.

THE USE OF STEAM IN FURNACES.

Mr. Wood—Mr. President, at the February meetings of the New England Association of Gas Engineers, and the Ohio Gas Light Association interesting papers were read in which were discussed the possible or probable loss or gain resulting from the use of steam in our furnaces. I have no doubt you all read those papers, as also the discussions that followed, as published in the AMERICAN GAS LIGHT JOURNAL, and will no doubt be interested in knowing what others than gas makers are doing in the way of using steam as a promoter of combustion. The New York Central and Hudson River Railroad Companies are using steam for this purpose on their locomotives to great advantage; and although the conditions are somewhat different—as they introduce the steam and air over the fire, while we introduce it under the grate bars—yet they get extraordinary results from its use. The plan of operation is the invention of Mr. Buchanan, Supt. of locomotive power for that road; and through the courtesy of Mr. S. L. White, Master Mechanic, I am enabled to give you a description of the device which they have already applied to many of their locomotives, and which they will also apply as fast as possible to the remaining ones. The fire-box of the locomotive is divided into two compartments by means of a horizontal partition which they term a "deflecting plate." The plate is attached to the inside of rear (side) of fire-box at a point just below the lower flues—raising at a slight angle to front of fire-box, in the center of the deflecting plate, is a round opening, say, 10 inches in diameter, through which all of the products of combustion pass to the upper chamber of fire-box, thence into the flues of boiler. Through the front and rear of the fire-box are located short flues, say, 2½ to 3 inches in diameter, made fair with inside and outside of shell of the box—there being four of these flues in front and rear, or eight in all, placed equi-distant apart, just over the fire, or between it and the deflecting plate. In the center of each of these flues is placed an iron cone, and the jet of steam, under control of engineer, is adjusted to strike the apex of the cone, thus carrying a quantity of air with the steam into the combustion chamber, there uniting with the products from the combustion of the coal to produce a most intense heat, which passes through the opening in the deflecting plate into the upper chamber. An examination of the upper chamber through a sight-hole shows a most beautiful white heat. *All of the smoke is consumed;* no smoke is to be seen escaping from the smoke stack; and in their round trips from Syracuse to Buffalo and Albany and return *twenty-five per cent.* of the weight of coal formerly used under the old practice is saved. This has been demonstrated daily for several months; and I believe there is economy for us in using steam in our furnaces as evaporated from the water in the ash-pans.

LUNCHEON AND INSPECTION.

The hour of noon being reached, in accordance with the programme, the members were escorted to an apartment adjoining room in which the meeting was held. There they partook of a substantial luncheon, and after its "absorption" proceeded to make inspection of the new works of the "Gas Light Company of Syracuse." Superintendent A. C. Wood acted as guide, and when the beauties and compactness of the plant had been carefully examined the Association returned to the meeting-room, where they were called to order by the Chairman *pro tem.* That official then informed Mr. Wood that the members were in readines to hear the promised communication descriptive of the new plant of the Gas Light Company of Syracuse.

(To be Concluded.)

LARGE CASTING IN ITALY.—The largest casting ever attempted in Italy was successfully accomplished at the ironworks of Signor Gregorini, Lombardy. This colossal block of cast iron, measuring 494.43 cubic ft., and weighing 105 English tons, is intended for the anvil of a 10-ton steam-hammer now being constructed for the Royal Arsenal of Spegia. The operation occupied twenty-three hours.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

MANCHESTER, June 10, 1885.

The Gas Institute; Its Past, Present, and Future.—Programme of the Present Meeting.—Meter Testing at Manchester.—Sulphate of Ammonia.—Electric Light at the Inventions Exhibition.—Gas as a "Second String."—The Lamp Post of the Future.

Writing from the city which enjoys the honor of being the birthplace of the Gas Institute—for it was in this town, in the year 1863, that the "British Association of Gas Managers" was inaugurated—my thoughts naturally turn towards this Association and its work. After a prosperous career of 18 years under the latter title, the former more comprehensive name was adopted in 1881; whether for "better or worse" has yet to be proved. Certainly the number of members of all classes has increased from 675 in 1881, to 873 in 1885; but as this increase is largely made up of "Associates"—a class who only contribute 10s. 6d. per annum, and cost the Institute about 15s. per head—the condition of the funds has not shown that improvement which should be apparent concurrently with the increase of members. The British Association of Gas Managers "pursued the even tenor of its way" until some six or seven years ago, when a certain restlessness, a vague desire to extend its sphere of usefulness, to soar to higher heights, became apparent among its members. Some wished to do one thing and some another. In an indefinite clamor of tongues the change of name was carried, and this, so far from promoting a feeling of unity, has proved, in some sense, an apple of discord. At each subsequent meeting discussions have arisen as to the rules on points of management and administration respecting the work that should be taken up by the Institute, and all sorts of subjects; and, so far as can be judged, the present meeting will "keep the ball rolling," as several amendments in the rules are to be proposed, including some of a decidedly debatable nature.

But it must not be concluded that these differences are altogether an unhealthy sign. We have in this country a frequently-quoted proverb, "unity is strength;" but it is not of universal application, for the unity may, in some circumstances, arise from supineness or indifference. Indeed, differences of opinion are often a sign of strength, as showing that a numerous company comprising many different casts of opinion and thought, have determined that certain things should be done, but do not agree on points of detail as regards the mode of procedure to be pursued. Frequently a well-looking youth, on approaching towards manhood, exhibits a certain uncouthness of frame that entirely disappears on full development being attained. With regard to our Institute, it has been passing, since the change of name, through an active period of development; the Council, being no more than human, have made a few mistakes; but looking at the intense interest manifested in its progress—sitting in its crowded meetings and looking around, with a knowledge of the intellectual and general capabilities of many present, the stupendous achievments that they have brought to a successful issue in spite of all sorts of obstacles and adverse circumstances, it is impossible to feel downcast respecting its future. The body of men comprised in the muster roll of the Gas Institute are capable of carrying out useful work in connection with their special industry; and, in spite of present clouds, the Institute will go on and prosper, competently filling a dignified and important position as the recognized representative of the gas industry in this country.

Of the twenty-four gentlemen present at the first meeting in 1863 only seven now remain with us. A few days since one of these, Mr. P. Simpson, of Rugby, entertained his fellow survivors, Messrs. Fraser, Hutchinson, Leather, Martin, Newbigging (the President for 1885), and Patterson, at dinner, in commemoration of the visit of the Gas Institute to Manchester. This pleasant little gathering took place in an hotel at Rugby, in which some of the preliminary meetings in connection with the formation of the Association were held.

The programme now in course of execution comprises a fair representation of the various practical and theoretical questions at present claiming the more prominent share of attention in the profession. Sir Frederick Siemens gives a paper "On distributing light and heat and supplying heated air to ordinary gas burners." As might be expected, gaseous fuel and combustion come in for a large share of attention. Mr. William Gadd is to treat of "The effects of heated air on combustion," and Mr. William Sugg takes the subject of "Lighting and ventilating ordinary apartments by gas." If Mr. Sugg follows out the course adopted in his previous papers and lectures on gas lighting and ventilation, and notably in his little treatise on "The Domestic Uses of Coal Gas" (a book which every gas consumer, who would rather save money than abuse the gas company, should read), the result cannot fail to be another valuable contribution to our knowledge of this important subject. Mr. H. Townsend, who is known to have devoted special attention for some years past to the supply on a large scale of a cheap non-luminous heating gas, of the kind generally known as "water gas," contributes a paper on "Gaseous fuel." The subject selected by Mr. Denny Lane, of Cork, viz., "On the first principles of the gas engine," bears some relationship to these. So altogether the extended use of gas comes in for a large, but by no means unnecessary, share of attention; for if gas companies do not promptly and energetically attend to the demand for gaseous fuel, which is continually increasing, other parties will step in to supply it. Mr. Denny Lane, by-the-way, is the President elect for next year, so perhaps the 1886 meeting of the Institute will be held at Cork. Most of the members of the Institute will be pleased to visit the sister Isle, and especially so if their visit is also the means of indirectly offering a compliment to Mr. Denny Lane. Mr. John Corks, in speaking "On the administration of foreign gas works;" Mr. W. Carr, in taking up the debatable subject of "Gas works rating;" and Mr. F. D. Marshall, in treating on "Differential prices for gas," will respectively represent the financial aspect of the gas industry. And Messrs. Hepworth, Read, and Newbigging, and Prof. Otto Intze, respectively contribute papers on the manufacture of sulphuric acid, gas holders and tanks, and testing coal. The hearing of these papers, with the subsequent discussions, together with the visits to the Manchester gas works, Messrs. Crossley's gas engine works, and other places of interest, cannot fail to make up an enjoyable and useful meeting.

The report of the official inspector of gas meters for the city of Manchester, for the year ended March 31st last, which has just been published, furnishes some interesting information as to the accuracy of gas meters. The number of meters tested was as follows: 5,109 new wet, and 161 new dry meters, 3,106 used wet and 1,333 used dry meters. The number rejected as not accurate within the provisions of the "Sales of Gas" Act, which specifies that gas meters must not be more than 2 per cent. fast, or against the consumer, or 3 per cent. slow, or in favor of the consumer, was 19 of the new, and 294 of the old wet meters, and 7 of the new, and 429 of the old dry meters. As expressed in percentages of the number tested it was: new wet meters, 0.37; old wet meters, 9.46; new dry meters, 4.34; old dry meters, 32.18. The wet meters evidently had the best of it, both as regards the new and also the used meters. But it must be remembered that while the dry meter tests fairly represent the measurement at the consumer's premises, the same cannot be said with regard to the wet meters, unless care was taken to maintain the proper water level. I venture to think that the statement that out of 1,333 used dry meters no less than 429 were rejected as inaccurate according to the Act, is one that scarcely does justice to the average dry meter as usually supplied in this country; perhaps the greater portion of the particular dry meters tested consisted of an old and therefore much less accurate kind than those at present manufactured.

In reference to the remarks in my last letter about sulphate of ammonia, I notice that, as anticipated, Mr. McAllum's assertions have not been permitted to pass unchallenged. Mr. F. J. Lloyd, F.C. S., of Kings College, has come forward in the columns of the *Gas Journal* with a number of indisputable practical statistics in favor of the value of sulphate as a manure. As further practical refutation the present condition of the market may be referred to. For two or three weeks past this has showed signs of improvement. Not only is an increased inquiry from buyers noticeable, but distinctly improved prices have been obtained both for present and forward deliveries. It happens rather singularly that this advance has been attended by a decline in the demand for nitrate of soda; from which it would appear that for some purposes, such, for instance, as for beet root crops, the sulphate is preferred to the nitrate. But gas companies must not hope to obtain as a permanency more than £11 or £12 per ton for this product; as, if the prices should range above this figure, a considerable quantity would be produced from coke ovens, blast furnaces, or, perhaps, specially worked up from waste coal heaps, etc., and so the market would soon be overstocked to a sufficient extent to bring the prices back to their original level.

The Inventions Exhibition at South Kensington, which is one of the series of annual exhibitions that are being held under the auspices of the government, it is needless to say, is a very extensive affair. As with the Fishery and the Health Exhibitions, it is remarked that the electric light enjoys the favor of those governmental officials who superintend the management of these large exhibitions; and the whole space allotted to gas exhibits is very much less than that occupied by the engine shed for generating the necessary electricity. Of course, coal gas is at hand ready for use in case of sudden failure; and, if general rumor is correct, it does not enjoy a sinecure. Perhaps the administrative committee recognizes the fact that the electric light requires a great deal of influential official support to enable it to stand its ground anywhere; while gas can carry its own credentials. But for the sake of completeness in an exhibition claiming to be a fair representation of modern inventions, the recent appliances introduced in connection with so general and extensive an industry as that with which we are intimately concerned, should have been more prominently set forth.

When gas is used as a "second string" in readiness for any failure on the part of the electric light, care should always be taken to leave the gas tap in

charge of a "cool hand." At a recent public meeting in a large hall the fickle and changeful brilliancies of electricity were used for illuminating the festive scene, the gas jets being lit and turned down low in readiness for any emergency. At a critical period the electric light failed, and two or three committeemen, applauding their own prethought, rushed to the main tap. But "there's many a slip," etc.; in the hurry they turned the tap the wrong way, and so completely extinguished the gas.

In the present rage for improvement—I will not say for change—even the smallest and apparently most unimportant subjects do not escape notice. A writer in an engineering magazine of recent date has expended some of his surplus ingenuity in pointing out the faults of the present forms of lamp posts from an æsthetic point of view. Besides being rendered "beautiful forever," he considers they might be turned into practical account and utilized as letter boxes, telephone stations, or expanded into a sort of sentry box for policemen. Possibly there may be room for improvement in the design of the post so as to render it light and unobtrusive in form, especially as regards those structures carrying three or more lamps, which are sometimes to be met with in the principal thoroughfares and at the crossings in our large towns, but which are, fortunately, rapidly giving way to the more efficient and economical compound burner; but to expand the lamp post into a mixture of a pillar letter box and sentry box would scarcely be an improvement. The *utilo et dutie* thus implied must be regarded as a mere vision, and any real improvement in the street lantern and lamp post—and it may be admitted there is room for such—must be in the direction of simplicity, the old-fashioned heavy column of cast iron being replaced by a lighter and more elegant structure of wrought iron or steel. But if the posts remain as they are, no one will be interfered with or injured in any way by them.

[A Paper presented by the author before the 22d Annual General Meeting of the British Gas Institute.]

On Testing Coal for its Producing Qualities.

By T. Newbigging, C.E., Manchester.

It is almost impossible to judge from the appearance of a coal whether its gas and coke yielding qualities are good, bad, or indifferent. So far as outward indications go, nothing is so deceptive to the inexperienced in such matters; and even to those who have had large practice in coal testing, it is very difficult to forecast with any certainty the result of a trial of any particular sample.

Some of the poorest coals and cannels have a fatty, unctuous appearance, suggestive of richness in gaseous properties; again, the most valuable cannels and shales, yielding gas in extraordinary abundance, have a dull, earthy cast, which might readily be taken as indicating poverty of composition and yield. The rich Boghead (Scotland), Sydney (New South Wales), and Cloverport (Kentucky), cannels and shales are striking examples of this latter kind. On the other hand, this does not hold good of the Brazilian shales or "Turba" that have come under my notice. These have a dull, clayey appearance, and are very indifferent both in the yield and in the illuminating power of their gas. The importance of being able to test samples of coal or cannel, or of having them tested by a specialist in whom reliance can be placed, before entering into a contract for the material in bulk is therefore obvious.

A test may be made either on a working scale, or in the experimental apparatus in the gas manager's laboratory. In the former case several tons of the material have to be used, and the trial of a single sample is a formidable and tedious process, extending over many days, until the old gas in the apparatus and holder has been replaced by the new. It is obviously impossible to test a variety of samples in this manner within a reasonable period. Besides, such a method of testing is not always satisfactory. The manager has to take a good deal for granted; he is largely dependent on subordinates for the attention and care that ought to be exercised, because his constant personal supervision throughout the time occupied by the test is out of the question.

The experimental test, in my opinion, is to be preferred for many reasons. The small apparatus is more under the command of the operator. Full justice is done to the material. The best results it is possible to obtain are secured. Time is economized in making the tests, because a number of samples can be tried in the course of, say, ten or fourteen days.

It may be urged against the experimental or laboratory test that, in practical working, equal results are unattainable. If this be the fact it only proves that either the practical working is at fault to the extent of the difference in result, or that the bulk of the material is not equal to the sample tested. Assuming, however, that the sample is a fair average of the whole, whatever the deficiencies of practical working may be, the coal at least should not be depreciated below its intrinsic value through defective heats and other faulty methods of carbonization. And although the actual everyday working of the material may afterwards fall short of the results obtained in the trial apparatus, these latter are a standard at which to aim. As a general rule the difference between the results of actual use and the experimental results, with efficient plant and careful supervision, will not exceed 5 to 7 per cent. in favor of the experimental test.

To argue that the quality of a coal should be judged and determined solely by the results yielded by actual working, is just about as reasonable as to say that the illuminating power of gas should be decided by the methods of consumption, through possibly defective fittings, and some of the burners largely in use by consumers. Whether coal or gas, the means best calculated to develop its intrinsic qualities should be adopted.

In the apparatus the charge to be used is the 1,000th part of a ton, viz., 2.24, say, 2¼ pounds.

Care should be taken to obtain a fair average sample of the coal to be operated upon. For that purpose at least half a hundredweight of the material should be broken up into small pieces and thoroughly intermixed; and from this three several charges are to be taken without selection.

The retort should be got up to, and maintained throughout the charge, at a bright red heat. If from any cause the temperature is much reduced, the test will not be satisfactory. This is especially the case in testing cannel and the rich shales. The time required to work off the charge of 2¼ pounds will range from 40 to 60 minutes, according to the character of the coal.

The illuminating power of the gas given out from each charge should be ascertained by the Bunsen photometer, no other being sufficiently trustworthy for that purpose. The average of the three tests is then taken, both for yield of gas and coke, and for the illuminating power of the gas, and this will fairly represent the capabilities of the coal.

The further conditions to be observed are that the holder be entirely emptied of air, or of the previous charge of gas, and that the condenser be drained of its contents. The test charge may be continued until the whole of the gas is expelled, or otherwise, depending on circumstances. In comparing two coals an equal production from both may be obtained, and the comparative illuminating power then ascertained.

The coke and breeze should be carefully drawn from the retort into a water-tight receptacle made of sheet iron and closed by an air-tight lid; this is then placed in a bucket or other vessel of cold water, and when sufficiently cooled the coke is weighed.

For ascertaining the quantity of tar and ammoniacal liquor produced, drain the yield of the three charges from the condenser, and measure this in a graduated liquid measure. The number of fluid minims in a gallon is 61,440. Thus:

60 fluid minims = 1 drachm.
8 drachms = 1 ounce.
16 ounces = 1 pint.
8 pints = 1 gallon.

Then:

The weight of the three charges of coal.	Lbs. per ton.				
As 6.75	: 2,240	: :	The number of minims of tar and liquor obtained.	:	The total number of minims of tar and liquor in a ton of the coal.

And this, divided by 61,440, gives the gallons of tar and liquor produced per ton.

Mr. T. Fletcher has recently produced an experimental retort which is heated by gas. This is handy in application, as the required temperature can be got up in less than a third of the time occupied when firing with coke. The temperature of distillation is also under perfect control, and may be regulated with nicety, which is a consideration of great importance in experimental work.

Gas Appliances at the Parkes Museum.

Wherever and whenever the opportunity is presented the English manufacturer of domestic gas appliances avails himself of the occasion to make the public better acquainted with the advantages and utility of such wares; the inevitable result being that the average English housekeeper is pretty well posted on the economy, cleanliness, and convenience of gas heat in its application to ordinary domestic purposes. Keeping in mind the great attention paid to this branch of the English gas industry, and the well-merited success that has been the reward of such attention, it would seem as though our American manufacturers might do well to experiment more closely upon the lines followed by their English brethren. An opportunity, and an excellent one, is soon to be granted the home talent to show what it can do in the line of display, and we sincerely hope that every advantage will be taken of the generous opportunity offered by the Franklin Institute in its projected "Novelties Exhibition."

Returning to the subject named in the headline given above, the London *Builder* publishes a "chatty" article on the exhibition of domestic gas appliances at the Parkes Museum (England)—for an inspection of which invi-

tations were issued on Saturday, June 6—from which we extract the following:

The exhibition is given for the purpose of displaying the exceedingly useful inventions of Mr. Fletcher, of Warrington, and therefore does not possess that wider interest which attaches to a general display of the works of many minds, and it presents none of the critical aspects of comparison. But it has the one advantage of being a unique collection of goods of the highest repute, crowned by gold medals and other awards by many international and other exhibitions, and of classes of articles of extensive and wide-spread use.

The star burners, the concentric burners, the radial burners are familiar objects in shop windows, and are universally accepted as exceedingly handy and useful; and the various less familiar modifications, such as those adapted for soldering irons, hatters' irons, laundry irons, and the drip-proof burner for glue-pots and liquids liable to boil over, are in great demand for their special purposes and applications.

There is another purpose to which gas heating is extensively applied—that of boiling water; and for this service many ingenious devices are shown. One of these, the most noticeable from its small size and its efficiency, is the small instantaneous water heater, formed by a cylindrical perforated burner, surrounded by a coil of twenty or more volutions through which the cold water flows, under the influence of the gas flame, for the whole length of the coil. Thus, say that the length of the burner is 12 in., and the diameter of the coil 3 in., the length of the pipe in which the water is heating in its passage past the flame will be, roughly, about 9 ft. It is easy, therefore, to see how water may enter at one end of the coil cold and go out at the other end hot. A very simple and perfect little instrument of this kind is shown, formed of a straight horizontal burner of about the above dimensions, for attaching to the walls of lavatories and other places where small quantities of hot water are frequently or occasionally required. The like principle of a coil is applied to the interior of the larger boilers for restaurants and hotels, around which in those cases the flame or hot air circulates freely amongst the volutions of the coil. There are also large hot water vessels heated by the star and radial burners from below. The small coil articles, however, have a most attractive appearance, and are designed with that forethought and intimate knowledge of requirements which characterize all Mr. Fletcher's inventions.

Another very useful article remains to be noticed amongst the smaller goods—the coffee roaster. The atrocious manner in which coffee is commonly prepared needs an almost universal remedy, and the hope cannot be suppressed that these little instruments may have a very wide employment. In sizes they are made from that equal to roasting from 2 oz. to ¼ lb., up to a large size for hotels for roasting from ¼ lb. to 1½ lb. A quarter of a pound may be roasted thus in four minutes, and a pound in eight minutes; and we were assured by the attendant who showed the goods that a saving of 4d. per pound would be effected by the apparatus—a strong recommendation to housekeepers.

Two other different applications of gas to its natural purpose of heating—for cooking apparatus and for stoves for heating rooms—are represented by many well considered productions. The cooking stoves are of excellent design, and the lecturer on cooking at the Parkes Museum speaks most approvingly of their practical application. Gas for cooking, however, is not popular with domestic servants, and gas stoves in the kitchen are even strongly disliked. But the objection to them is in the largest degree that there is no fire to be seen. The watching of the flames and glowings of a coal fire has universal attraction; even dogs enjoy basking in the warmth of its rays and in its wavering light. For them, no more than for servants, does the gas fire seem to complete the appearance and the comfort of home. It is the same in all classes of society. The open grate and the coal or wood fire is the symbol as well as the reality of home. And although Mr. Fletcher produces excellent stoves with asbestos fiber squares of unquestionable quality, it is only for temporary purposes that such stoves have as yet in the world any actual occupation. They are very convenient in reception and other rooms, where visitors are intermittent, or occupation exceptional. They are also very handy at particular seasons, as late spring, or in autumn, when cold days interpose with warmer weather; but the gas fire for sitting-rooms and for bedrooms, in the present circumstances of the gas itself, is distinctly not a sanitary arrangement. The fault, however, is not separable from the gas companies. Nor can Mr. Fletcher do better until he can get gas—or, more correctly, pure hydrogen; for it is the pure hydrogen that is required for heating, and not the mongrel compound, carburetted hydrogen, supplied for lighting purposes. The carbon deteriorates the gas for all heating purposes. It is the source of smoke and of fumes; and neither cooking nor domestic heating can be properly effected when such impurities arise. To avoid them requires, under present circumstances, very careful manipulation. For cooking, gas should, indeed, be the most perfect fuel. Its quantity can be perfectly regulated; its combustion equally perfectly assured; and consequently the exact temperature can be applied with unvarying certainty for any period of time; or the temperature can be raised or lowered in any way desirable. There is no waste of fuel; there is no time occupied is getting up a fire, as with coal, nor any further time taken in letting down a fire when once got up. There is no fire to be maintained whilst none is wanted against some future period when the fire will be wanted. The ingenious devices Mr. Fletcher puts forward in the shape of cooking stoves are everything seemingly required for the application of gas, and they ought to tempt cooks to trials of them. The burners can be used singly or in multiple; they revolve, so that by turning the flame downward grilling may be performed by the radiation from them downward, whilst boiling may be performed by the hot air rising upward from the flames beneath. Large square central chambers, clean whitewashed on the sides, and with gravy trays at bottom, afford admirable spaces for the cooking of joints or poultry. Double iron doors with silicate packing between the thin outer and inner sides stop all outward radiation of heat. The handiness, cleanliness, and convenience seem unexceptionable; but we doubt whether, whilst the companies carburet their hydrogen, gas cooking will take extensive hold in general domestic service. The admirable way in which gas stoves can be used even now in large establishments by trained experts is indicative of what their application might become if the gas supplied were more suitable for the purpose.

The Parkes Museum authorities are doing well in submitting such an excellent series of special class goods to the public view, and which are so worthy of being selected as specially illustrating the sanitary conditions attainable even now by common gas in its present state.

Train Lighting.

Engineering claims that electricity has lately been tried for train lighting in Germany, at Frankfort-on-the-Main. The experimental train consisted of a first, second, and third-class carriage, and a luggage van containing a Mochring dynamo, and 26 accumulators. The dynamo was driven by pulleys and belts from the axles of the wheels of the van at a speed of 700 revolutions per minute, when the train was running at a speed of 18 to 42 miles per hour. When the speed was less than 18 miles per hour the lamps were thrown out of circuit with the dynamo and accumulators, and fed from the accumulators direct by an automatic commutator. During the day the accumulators were charged with the lamps out of circuit. The cost of installation was 125*l.*, and weighed about 12 cwt. There were 12 incandescent lamps in all, and the cost of fitting up each carriage is estimated at from 3*l.* to 4*l.* The experiments demonstrated that the electric light is capable of lighting trains in motion and during stoppages; and the cost is estimated at about 1d. per lamp per hour. The trials continued for six weeks, and as everything was done automatically except at starting, the attendance required was slight. The difficulty of breaking up a train and shunting on to a new line while keeping the carriages lighted does not, however, seem to have been dealt with in these experiments.

[As *Engineering* saw fit to mention that one omission was made in the experiments, a disinterested person might be led to remark that the cost of installation and lighting charges (as evidenced by the figures given, as developed by the German railway experimenters) would more than likely prove a sufficient bar to the extension of the system. Those interested in the matter of lighting railway carriages with compressed gas will not tremble much over a recital of the Frankfort-on-the-Main experiments.]

On the Removal of Paint and Varnish.

A contemporary explains that where it is requisite to remove painting entirely from its ground it is usual to resort to mechanical scraping, etc., or to the very dangerous operation of setting fire to the painted surface immediately after washing it over with oil of turpentine, called turps, for burning off the paint from old disfigured work—an operation that may be safely and more easily accomplished by laying on a thick wash or plaster of fresh-slacked quicklime mixed with soda, which may be washed off with water the following day, carrying with it the paint, grease, and other foulness, so that when clear and dry the painting may be renewed as on fresh work. Clear-collying is sometimes resorted to over old painting, for the purpose of repainting, in which case the surface exposed to the sun's rays or alterations of temperature is liable to become blistered and scale off. Varnish may be removed by friction—if it be a soft varnish, such as that of mastic, the simple rubbing of the finger ends, with or without water, may be found sufficient; a portion of the resin attaches itself to the fingers, and by continued rubbing removes the varnish. If it be a hard varnish, such as that of copal, which is to be removed, friction with sea or river sand, the particles of which have a rotundity that prevents their scratching, will accomplish the purpose. The solvents commonly employed for this purpose are the several alkalies, alcohol, and essential oils, used simply or combined. Of the alkalies the volatile in its mildest state, or carbonate of ammonia, is the only one which can be safely used in removing dirt, oil and varnish from a picture—which it

does powerfully; it must, therefore, be much diluted with water, according to the power required and employed with judgment and caution, stopping its action on the painting at the proper time by the use of pure water and a sponge. A thick coat of wet fuller's earth may be employed with safety, and, after remaining on the paint a sufficient time to soften the extraneous surface, may be removed by washing, and leave the picture pure; and an architect of the author's acquaintance has succeeded in a similar way in restoring both paintings and gilding to their original beauty by coating them with wet clay. Ox-gall is even more efficacious than soap. In filling cracks and replacing portions of the ground, putty formed of white lead, whitening, varnish, and drying oil, tinted somewhat lighter than the local colors require, may be employed, as plaster of Paris may also in some cases; and in restoring colors accidentally removed, it should be done with a vehicle of simple varnish, because of the change of tint which takes place after drying in oil.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Something from Tiffin, Ohio.—Mr. Jos. M. Bate, Secretary and Supt. of the Tiffin Gas Light Company, writing to the Journal office, under date of June 22d, says: "The article contributed to the columns of Journal, in issue of June 16th, by Mr. Frederic Egner, fits the case of the Edison Electric Lighting Company of this place, with two exceptions, the points of difference being in regard to the total number of lamps in use, and price of coal. At Tiffin the total of incandescent lamps foots up to 600 ten-candle power lights—this statement includes all descriptions or powers of lights, but I have averaged them on the basis of ten-candle power—and coal costs nearer to $3 than to $1.65 per ton. It is only on rare occasions and with new lamps that a rated 16-candle incandescent gives a light better than eight candles. In one instance that I knew of here nine 16-candle power Edison lamps were installed to replace four 7-feet gas burners; and the electric illumination that resulted from the substitution was far from being the equal of that which it superseded. We—*i. e.*, the Tiffin Gas Company—can replace ten of their 16-candle power lamps with seven gas burners (Bray, six feet), and the superiority of the gas illumination is readily and at once acknowledged. The electric lighting supplied at Tiffin is generally arranged for under the contract system, and the charges for same have now been reduced by about 50 per cent. from those which rated in 1884. With our Edison Company stoppages are frequent, and their customers come and go. Despite all their efforts, and notwithstanding their 50 per cent. reduction in prices, a majority of those using the electric light are either stockholders in the Edison company, or else rent their premises from those who are pecuniarily interested in that corporation. We still maintain a standard gross rate of $2.25 per 1,000 cubic feet for gas, with certain stated discounts; and also stand by our colors in the matter of 20-candle power gas. We use Second Pool Youghiogheny, and employ Kanawha cannel for enriching. For my own part, I believe that good coal gas, sold at a low price, has nothing to fear from Mr. Edison's incandescent system." The trouble with Mr. Edison has been that he has found out how much his system has got to fear from illuminating gas, and it has been noted, no doubt, the "wizard" is less free and outspoken in his declarations regarding the fact that the gas industry was about to be "wiped from the field of its former triumphs." It will stand "a deal of rubbing" yet, Mr. Edison; and the truth is, "the more it is rubbed the better it shines."

Old Wooden Water Pipe.—Some two or three years since we had occasion to note the removal of some long sections of wooden water pipe, put down, over 60 years ago, by the Manhattan Banking Company, in the downtown district of New York city, when that corporation included among its other pursuits the supplying of water to a certain section of the metropolis. This pipe was in remarkably good condition after its long burial, and we supposed that its preservation was in great part attributable to the nature of the soil in which it had been imbedded. This, however, would not seem to have exerted such a great influence after all; since the testimony of Mr. P. A. Taylor, of the Engineers Club, of Philadelphia, Pa., given at a business meeting of that body last December, goes to show that a section of the wooden water pipe laid by the late Stephen Girard, in the spring of 1834, a portion of which was unearthed in the fall of 1884, showed but little trace of decay. The nature of the soils, as between the location of the New York and Pennsylvania specimens of pipe that were removed, was totally different. The New York soil was in the nature of a fine sharp sand, while that of Pennsylvania was a soft clay. Mr. Taylor, in commenting on the matter, said: "The pipes were made of yellow pine logs, laid in sections, average length of each section about 18 feet; diameter of pipe, 15 inches; diameter of bore, 3 inches. It was laid from a dam located on a small stream known as Mud River, nearly on the summit of Broad Mountain, for a distance of 1¼ miles to the head of Plane Number Five, of the Danville and Pottsville Railroad. It was used for the purpose of conveying water to the steam engines for hoisting loaded cars from the Mahanoy Valley. The fall from dam to boilers was about 40 feet. The pipe from which the specimen under discussion was cut was dug out of the ground in 1884 by the Philadelphia and Reading Railway Company, which had built a new dam on the same site as the old one for the purpose of gaining an ample supply of water for its locomotives, stationary engines, etc. The company laid a new cast iron main of ten inches diameter, and followed as nearly as possible the old line of wooden water pipe. The specimen was found at a depth of about five feet below the surface, in a conglomeratic soil, and when taken out had been covered up for fifty years. When cut the specimen showed the pipe to be in a wonderful state of preservation, especially at the joints where the sections were connected. Sap was still in the wood."

A Lively Southern Gas Man.—Mr. C. W. Robinson, of Meridian, Mississippi, some three years ago made up his mind that this thriving southern town should be lit by gas, and having made up his mind to that effect, he instituted the Meridian Gas Light Company without much delay. On October 1st, 1882, the Meridianites had the satisfaction of being emancipated from the compulsory use of ill-smelling kerosene lamps. The sum of $35,000 was expended in construction, and this expenditure, or its result, was calculated as ample to meet the wants of the gas consumers of the town for several years to come. The calculation, however, was incorrect, simply for the reason that Meridian grew over-rapidly; and now Mr. Robinson finds himself compelled to double the capacity of the plant. It is expected that the enlargements will be perfected by September 15th. Mr. John Stafford is Superintendent of the works. It is about 21 years ago—to be precise, on the 19th day of Feb., 1864—since Gen. Sherman consigned the town of Meridian to destruction by fire, but it has been the decree of time that it should arise from its ashes and enter upon a new term of vigorous growth and business prosperity.

An Electric Fire.—Imperfectly insulated electric light wires, at midnight of June 17th, set fire to the awning in front of the premises No. 925 Broadway, New York city. Mrs. Lynch, the proprietress of the store, placed her loss at $25. Better set to work placing the wires underground; or, at any rate, let us soon have information that the Commission ordered by the Legislature to attend to this underground wire business is inclined to begin the investigation with which it was charged.

Patent Granted.—Mr. O. B. Monett, Manager of the Bucyrus (Ohio) Gas Works, informs us that letters patent have been granted him on that sheep-dip preparation of his, mention of which was made in previous issues of the Journal. The "dip" is made from the waste lime of gas purification; and perhaps Mr. Monett might be prevailed upon some day or another to inform us as to the method or system pursued in the manufacture of the preparation.

To Manage the Wausau (Wis.) Gas Works.—Mr. John Whitehead, formerly of Hamilton, Ontario, has been named as manager of the Wausau plant.

To Have an Agency at Chicago, Ills.—Messrs. Harris, Griffin & Co., the meter manufacturing firm of Philadelphia and New York, have determined to "move along with the procession," and announce that they have opened an agency or headquarters in the West. They have hired the premises, No. 75 North Clinton street, Chicago, Ills., and there propose to "keep open house" for the reception of their customers and friends. Chicago will soon be known as the home of the meter maker.

Prices of Gas at Nebraska City, Nebraska.—The following are the schedule prices of gas as sold at Nebraska City—the gross price (from which all discounts are rated) is $3.50 per thousand:

1,000	feet per month,	and	under	2,000	$0.20	per M.
2,000	"	"	"	3,000	.40	"
3,000	"	"	"	4,000	.60	"
4,000	"	"	"	5,000	.80	"
5,000	"	"	"	10,000	1.00	"
10,000	"	"	"	25,000	1.10	"
25,000	"	"	"	40,000	1.20	"
40,000	"	"	"	60,000	1.40	"
60,000	"	"	and upward		1.50	"

They Should Accept the Proposition.—On the evening of June 5 the City Council of Green Bay, Wis., received a communication from the managers of the local gas company in which the latter proposed that if the city would erect and use one-half dozen street lamps at stated places they would furnish all the gas supplied to city buildings at the rate of $2.40 per 1,000 cubic feet, and would agree to furnish gas for general consumption at $2.50. This proposition was referred to the committee on gas. We notice that, at

the same meeting, the joint committee appointed to consider the petition of the Western Electric Light Company, of Chicago, Ills., who asked that it be allowed to erect poles and stretch wires in and over the city for the purpose of supplying electric illumination, reported in favor of the project. The report was adopted; and now we may reasonably expect that before a great while Green Bay's taxpayers will be called upon to pay a nice round sum for electrical street disillumination.

FIGURING ON THE TAX ROLLS.—The personal property of the gas companies in the city of Brooklyn, N. Y., has been put down for 1885 at the following figures—the corresponding assessment for 1884 is also given.

	1885.	1884.
Brooklyn	$795,200	$802,800
Fulton Municipal	1,767,200	1,565,000
Citizens	361,000	470,000
Nassau	384,000	566,000
Metropolitan	322,400	315,400
Williamsburgh	437,800	373,000
Peoples	137,000	142,000
Totals	$4,204,600	$4,234,200

THE JAMESTOWN (N. Y.) GAS COMPANY MAKES A NEW DEPARTURE.—It is understood that the Jamestown Gas Company is making preparations to introduce incandescent lighting into the business district of that city. The best system or plan to adopt for carrying the scheme out is now under consideration, and will in large measure be determined by the advice of the Company's consulting engineers, Messrs. Westinghouse, Church, Kerr & Co., of this city. It may be good policy for gas companies to make investments in incandescent electric lighting plants; but, speaking for ourselves, we fail to appreciate the wisdom of the plan. If a gas company is so situated that it cannot supply gas light at a cheaper figure than that which must be charged in order to make a profit on incandescent electric lighting, it is about time that such gas company "spiked its retorts" and blew up its gasholder.

KEEPING THE ENGINES TO THEIR WORK.—It is said that the Fulton Municipal Gas Light Company, of Brooklyn, N. Y., operates two 40 horse power Westinghouse engines, on continuous stretches of six weeks at a time. That is keeping them on the "run," sure enough.

AWARDED THE FIRST PREMIUM.—The proprietors of the Laclede Fire Brick Manufacturing Company, of St. Louis, Mo., well known throughout the West and South as manufacturers of standard fire clay goods, had sufficient pluck and business tact to take advantage of the opportunity afforded by the late World's Fair, held at New Orleans, La., to make an exhibit of their manufactured wares, principally with a view toward letting the Southern gas man know how good an article of fire clay was yielded from the Missouri beds. We are glad to announce that the exhibit attracted very great attention, and are more than pleased to further announce that the Judges of the fair have awarded the St. Louis firm a first premium for the best fire clay gas retorts, as also for the best specimens of fire brick.

POOR BROOKLYN.—About the middle of May the Commissioner of City Works of Brooklyn, N. Y., acting under authorization of the Common Council, made contracts for the erection and maintenance of a total of 255 arc lamps. Each lamp is to be of 1,200 candle power, and their cost is to be 50 cents each per night, or $182.50 per year. The Municipal Electric Light Company, with its field of operations in the Eastern District, gets 151 of the arcs; the Citizens Company, operating in the Western (or principal) division of the city, being allotted 104. It is claimed that the first-named allotment (151) of arcs will displace 958 gas lamps, and the second (104) will dispense with 852 gas lamps. The true displacement of gas lamps by the arcs—the result of much close investigation by the writer—will be much nearer to 720 and 590 respectively; and, indeed, this estimate is somewhat in excess of that which will actually occur. As a sample of what they propose to accomplish it is only necessary to say it has been agreed upon that 20 arcs will be sufficient to illuminate the surface of Atlantic avenue from its beginning at South Ferry to the point where it is intersected by Fourth avenue. With that illustration, at least to those conversant with the topography of the City of Churches, "enuff is sed." While the territory of Brooklyn is nominally parcelled out between two electric lighting companies, the real fact is that the two are one—a sort of unity "as it were." When these people were given their franchise we made the assertion—and based it upon the names of one or two of the stockholders—that it would not be long before the electrical promoters fastened their grip upon the city's treasury. Brooklyn needs electrical illumination just about as much as the waters of Ridgewood* reservoir need salt.

MR. A. L. ALLEN, OF POUGHKEEPSIE (N. Y.) MAKES A DISCOVERY.—Friend Allen, now that he has succeeded in routing the electric lighting promoters "up his way," has turned his attention to the matter of proving that marsh gas is one of the most deadly poisons known to the toxicologist. Some Philadelphia amateur journalist tried his hand in that direction not long ago, but failed to make a lasting impression; and we are afraid that Mr. Allen will fall short of transmitting his name to posterity as a consequence of the marsh gas theory. If he wants to know how dangerous carbonic oxide really is to human life, let him read the following item.

* The name by which the source of Brooklyn's water supply is generally known.

KILLED BY GAS.—A sailor who registered as A. Steinert at Guest's Hotel, 127 West street, this city, at 12:30 A.M. of June 24th, was shown to room 32. At 9:30 A.M. same date it was discovered that gas was escaping in room 32. The door was broken open, and Steinert was found unconscious in bed. The gas had either been blown out or carelessly turned on after it had been turned off. The man died. He was about 35 years old.—*N. Y. Sun*, June 25.

PERHAPS DETROIT (MICH.) WILL BANISH THE TOWERS.—Detroit has enjoyed the distinction of being the most ridiculously-lighted (as to its streets) city in the world for a period of a year or so; but it seems just now barely probable that the electric towers have had their day, as, at the Council meeting held there on June 16th, a resolution was carried inviting tenders for lighting the streets from the gas company, and from electric lighting companies other than the Brush concern. It was supposed, in this neighborhood at least, that the Brush Company came pretty near to "owning" the public authorities of Detroit, and we would be pleased to have that supposition refuted.

UNITING THE TWO STATIONS OF THE CINCINNATI (OHIO) GAS LIGHT COMPANY.—On Monday, June 15th, the East End Station of the Cincinnati Gas Light Company was joined to the mains of the old works, and the two carbonizing plants are now practically one and the same thing. Those who read Gen. Hickenlooper's address,* delivered at the February meeting of the Ohio Gas Light Association, will have a pretty clear idea as to the magnitude and completeness of the East End Station of the Cincinnati Company; and the entire fraternity will join with us in extending hearty congratulation to the General and his associates over the happy termination of their big construction task.

SOMETHING FROM RICHMOND, VA.—On the evening of June 11th the Committee on Electric Light, of the Richmond City Council, met to consider bids which had been received for lighting the city by the arc system. There were two bidders—the Thomson-Houston Electric Company, of Boston, Mass., and the Schuyler Electric Light Company, of Hartford, Conn. The Schuyler Company agreed to furnish 100 arc lights at an equal charge or expense to that paid for the gas lamps that would be displaced. The Thomson-Houston folks offered to furnish 50 arcs at a charge of $120 each per year; if the city would order 100 lights the company agreed to charge but $108 per annum each. Judging from the tenor of the discussion it is quite likely that some sort of an electric lighting contract will be made; and we suppose that we may call upon Mr. Higgins to keep us informed as to the action taken.

PERSONAL.—Mr. Geo. Shepard Page, while on his travels out West, has been doing yeoman's work in the matter of exposing the fallacy and pretentiousness of the claims now being so recklessly made by the electric lighting promoters in the West. Mr. Page has a certain style of argument that carries conviction with it, and he is never slow in making proper use of the facts which his keen watchfulness is ever on the alert to capture.

NATURAL GAS AS A FUEL.—The Associated Press managers are responsible for the following statement: "Pittsburgh, Pa., June 22d.—By the first of next month every iron and steel mill in Pittsburgh and vicinity, with one exception, will be using natural gas as a fuel. This will reduce the consumption of coal here 38,250,000 bushels per annum, or nearly one-seventh of the yearly output of the region tributary to Pittsburgh. It will also throw out of employment thousands of firemen, coal heavers, and ash handlers employed in the mills." If the above estimate, regarding quantity of coal that will be dispensed with, is true, why, the colliery operators and coal handlers in that vicinity will experience a decrease in their receipts approaching closely to the sum of two and one-half millions of dollars. We have an idea that the "picture" is somewhat overdrawn.

ELECTRIC LIGHT ON RAILWAYS.—According to the *Railway World*, the Pennsylvania Railroad Company continues the experiment of lighting cars by electricity from Brush storage batteries, using the lights on a train running between Altoona and Pittsburgh. It claims that the arrangement has worked satisfactorily. The storage batteries are charged in the company's shops by connection with a Brush dynamo electric machine. It takes about 9 hours' running to charge the batteries with sufficient electricity for the round trip. The intention is, should the plan be found advisable for general use on through trains, to establish electric plants at different stations for charging batteries. Rather an expensive proceeding, we should judge.

*See Journal, March 16, p. 149.

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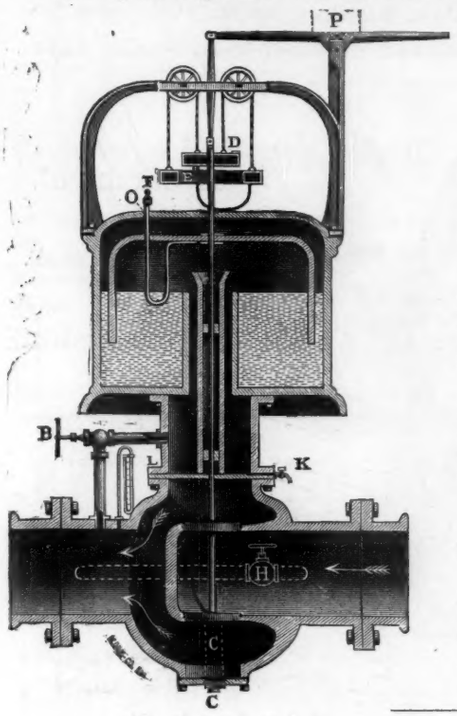


Will respond instantly, WITHOUT VIBRATION, to changing pressure from Telescopic Holders, or to any sudden increase in consumption, however large; which cannot be said of any other Governor. It is this feature that enables us to claim it to be

THE ONLY PERFECT AUTOMATIC GAS GOVERNOR EVER MADE.

It will control and regulate the pressure to suit the variation in consumption with perfect accuracy and absolute reliability. It will respond instantly to any unusual demand during the day or night, increasing volume and pressure together, and reduce same to the minimum as the lights are extinguished. It does away with all necessity for watching changes in the weather, or extra occasions of unusual demand, and insures the pressure being the exact amount required at all times.

We unhesitatingly claim our "Automatic Governors" to fill every requirement. They are simple in construction, cannot get out of order, will not corrode, occupy but little room, and can be placed and adjusted by anyone. They are capable of a wide range of adjustment, and can be set to any maximum and minimum pressure desired.

The accompanying cut shows the pressure held in the Columbus, Ohio, gas mains by one of our 16-inch Governors, the *light line* showing the pressure held during Friday, April 24th, 1885, and the *heavy line* pressure held Saturday, April 25th, 1885; the *two lines* showing the actual service of the Governor under varying demands. The accompanying letter from Mr. McMillin attests its wonderful perfection in very brief terms:

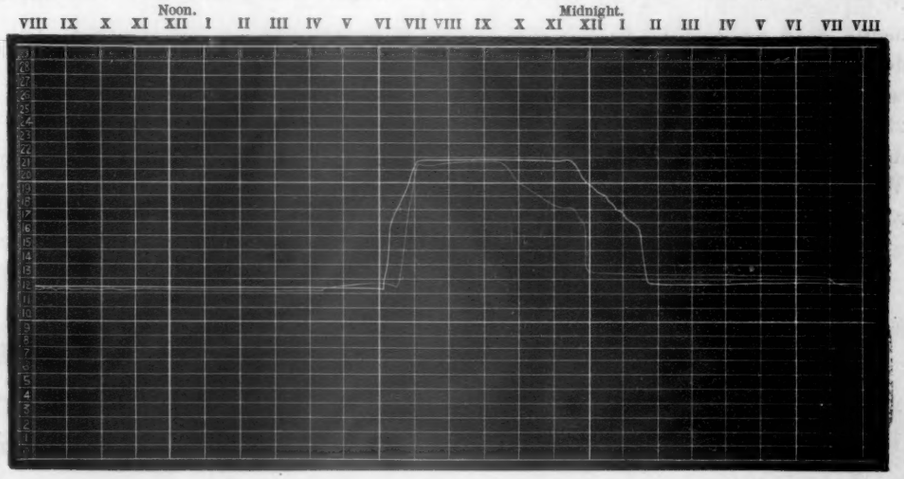
Pressure in Street Mains at Columbus Works.

COLUMBUS GAS LIGHT & COKE CO., COLUMBUS, OHIO, April 28, 1885.

MESSRS. CONNELLY & CO., LIMITED, No. 407 Broadway, New York:

Gentlemen—We have had one of your Automatic Governors in use for some months, and are well pleased with it. No attention is required more than to give it a few drops of oil once a week. The register card it makes clearly indicates the character of the weather, whether clear or cloudy. It puts three or four tenths less pressure on Sunday night than on other nights of the week, and takes the pressure off two or three hours earlier. In other words, *it supplies the demand*—no more and no less. Yours truly,

E. McMILLIN, Superintendent.



In calling the attention of our friends and patrons to our Automatic Governor we do so in full confidence that it will give most thorough satisfaction, and pay for itself in from one to ten months (depending upon the percentage of leakage), which any manager can easily estimate for himself. Certainly nothing can be placed in a gas works to-day that will pay for itself so soon. Correspondence solicited.

No. 407 Broadway, New York City. CONNELLY & CO., Limited. 33d & Smallman Sts., Pittsburgh.

New England Agent, C. H. SPRAGUE, 70 Kilby Street, Boston.

THE CLERK GAS ENGINE.

Highest Award American Institute, New York, 1883. Silver Medal American Institute, N. Y., 1884.
Gold Medal Awarded Crystal Palace Electrical Exhibition, London, 1882.
Highest Award for Motive Power British Section International Exhibition of Electricity, Paris, 1881.

Reliable.

No Boiler.

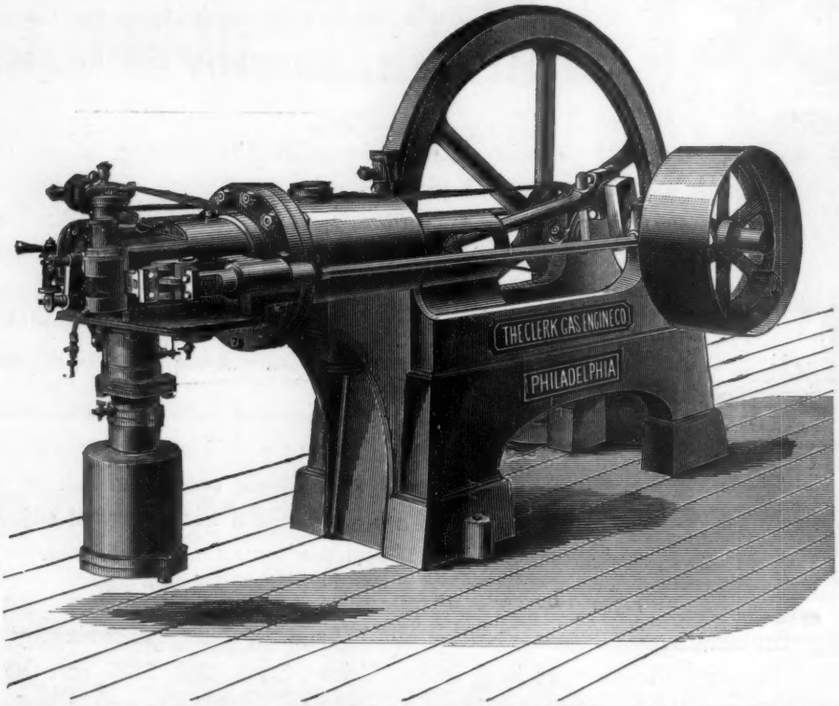
Steady.

No Coal.

Simple.

No Ashes.

Compact.



Economical.

No Engineer.

No Explosion

No Gearing Wheels.

No Danger.

No Parts requiring frequent renewal.

REQUIRING ONLY A MATCH TO START IT--GIVING ITS FULL POWER IMMEDIATELY.

We would inform the public that during the last few months we have improved THE CLERK GAS ENGINE to such an extent that we can now offer an engine vastly superior to our former pattern. These improvements have enabled us to sell our engine at a GREATLY REDUCED FIGURE, partly on account of the decreased weight (our engine weighing about half that of others giving the same Brake H. P). The consumption of gas has been decreased to a considerable extent, and the Brake H. P. has been increased some 25 to 30 per cent. All parts of the old design that were considered defective have been remodeled and new designs added. We now have an engine second to none as regards power, consumption, and ease of working. With our new engine all trouble in starting has been removed, the noise reduced to a minimum, and the regularity of motion is now all that can be desired. We guarantee all we claim for it, and the material and workmanship being of the best, enables us to guarantee the engine for twelve months.

SOLE MAKERS,

THE CLERK GAS ENGINE CO.,

WM. W. GOODWIN, President. E. STEIN, Secretary. S. LEWIS JONES, Asst. Secretary. L. P. GARRET, Supt.

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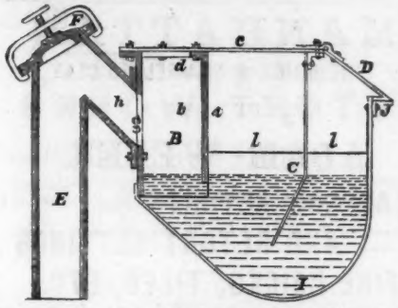
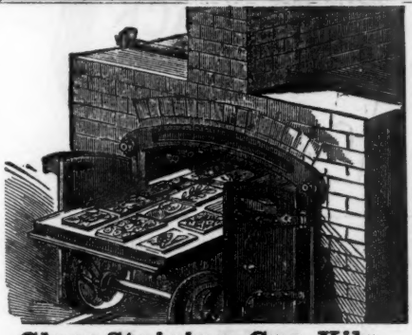


Boardman Hydraulic Main,

Patented October 7, 1884.

For description, see AM. GAS LIGHT JOURNAL of Feb. 2, 1884.
For terms, apply to

A. E. BOARDMAN, Macon, Ga.



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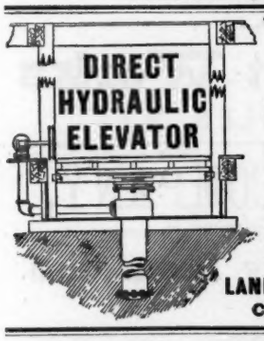

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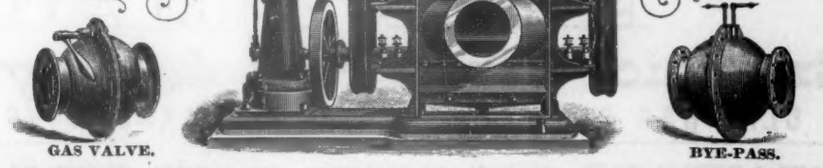

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IMPROVED GAS EXHAUSTER,

WITH ENGINE ON SAME BED PLATE, OR WITHOUT.

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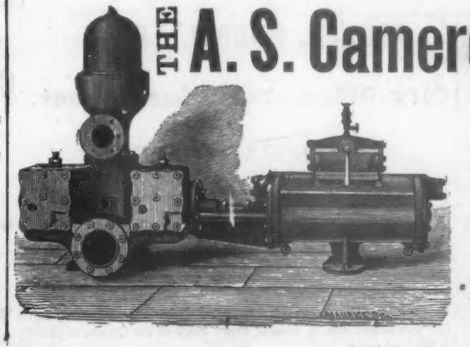

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RETORT WORKS.
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FIRE BRICKS, TILES, ETC.,
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LOCKPORT STATION, PA.
—ESTABLISHED 1864.—
WILLIAM GARDNER & SON,
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Of every Shape and Size to Order.
Standard Fire Bricks.

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Our immense establishment is now employed almost entirely in the manufacture of
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We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. Ou customers are in almost every State of the Union, to all of whom we refer.

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BALTIMORE
RETORT & FIRE BRICK CO.
MANUFACTORY AT
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Connection with the City by Telephone.
Clay Retorts, Blocks & Tiles,
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AND FIRE CEMENT.
Red and Buff Ornamental Tiles and Chimney Tops. Drain and Sewer Pipe (from 2 to 30 inches). Baker Oven Tiles 12x12x2 and 10x10x2.
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512 West Twenty-second Street, N. Y. **Arch and Twenty-second Street, Phila.**

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NEW DESIGN STOVES MADE IN CAST IRON, WITH EITHER OPEN OR CLOSED TOPS.

In presenting our "Economy" Gas Cooking Stoves and Ranges for the Season of 1885, we have the pleasure to inform our patrons that the increasing demand for these Stoves has encouraged us to make entirely new patterns, of HIGHLY ORNAMENTAL DESIGNS, for the popular sizes. We have also embraced the opportunity to increase the size of these Stoves, giving greater TOP PLATE AND OVEN capacity.

Full Lists and Catalogues are in preparation, and large stocks of Stoves will be kept at our Manufactories and Agencies for prompt shipment.

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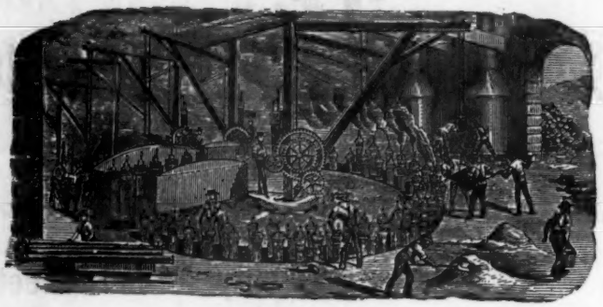

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Cast Iron Water and Gas Pipe

FROM TWO TO FORTY-EIGHT INCHES DIAMETER.

ALSO ALL SIZES OF

FLANGE PIPE for Sugar House and Mine Work.

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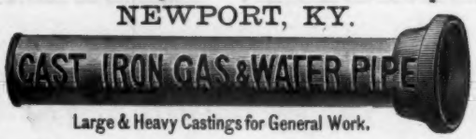

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Limited. Established 1848.

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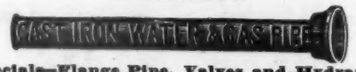

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Machinery and castings for Furnaces, Rolling Mills, Grist and Saw Mills, Mining Pumps, Hoists, etc.

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From 2 to 48 Inches in Diameter.

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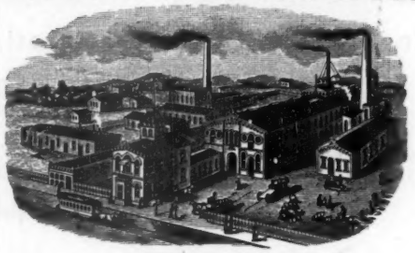

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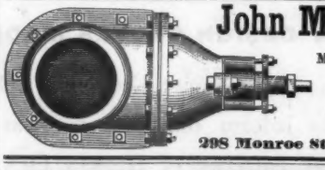
Hydraulic Main Dip Regulators, also Check Valves, Foot Valves, Yard-wash and Fire Hydrants. Send for Circulars.

Valves.—Double and Single Gate, ¼ in. to 48 in., outside and inside Screws. Indicator, etc., for Gas, Water, Steam, and Oil. nd for Circulars.



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Man'facturer of

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Silica Dinas Fire Brick & Cement.

Unrivaled for Endurance Under Intense Heat. Percentage of Silica, 95.64.

Also SCOTCH "BLOCHAIRN" FIRE BRICK.

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Siemens's Regenerative Gas Burners,

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THE CHEAPEST, PUREST, AND MOST BRILLIANT OF ALL GAS LIGHTS.

Superior to the Electric Light in Economy, Beauty, & Steadiness.

SPECIALLY ADAPTED FOR LIGHTING HALLS, FACTORIES, OPEN SPACES, ETC.

Numerous Tests made by various Gas Companies in the United States show an Efficiency of Ten Candle Power per Cubic Foot of Gas.

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N. E. Cor. 21st. St. and Washington Av., Philadelphia, Pa.

THE "STANDARD" WASHER-SCRUBBER,

KIRKHAM, HULETT & CHANDLER'S PATENT.

Total Capacity per 24 Hours of "Standard" Washers Ordered During the Following Years.

1877	4,000,000	cubic feet.
1878	4,750,000	"
1879	24,545,000	"
1880	42,967,500	"
1881	36,462,500	"
1882	39,300,000	"
1883	57,735,000	"
1884	26,177,500	"
Total	235,937,500	cubic feet.

Total Number and Capacity per 24 Hours of "Standard" Washers Erected and in Course of Erection in the Several Countries

	Number.	Cubic Feet per Day.
Great Britain	151	157,070,000
Western Hemisphere	38	39,337,500
Australia	18	12,150,000
New Zealand	2	650,000
France	6	4,550,000
Belgium	8	5,480,000
Germany	16	8,200,000
Holland	4	4,160,000
Denmark	1	150,000
Russia	2	3,500,000
Spain	1	350,000
India	1	400,000
Total	248	235,937,500

THE CONTINUED POPULARITY
Of these Machines

Will be recognized from the following extracts from letters from representatives of some of the companies having them in use:

PROVIDENCE GAS COMPANY,
PROVIDENCE, R. I., Nov. 24, 1884.

GEO. SHEPARD PAGE, Esq., New York:

Dear Sir—We are now using less than a gallon of water per thousand in the "Standard," and the gas at the outlet will not color turmeric paper.

Yours. etc.,
A. B. SLATER, Treasurer.

PORTLAND GAS COMPANY.
PORTLAND, ORE., Nov. 29, 1884.

GEO. SHEPERD PAGE, New York:

Dear Sir—Our Scrubber appears to run to our entire satisfaction, and we are pleased to say that it takes out all the ammonia from the gas. This is *very* satisfactory to us, as we were ruining our meters at a fearful rate heretofore. The amount of water used is very inconsiderable as compared with our old process. The machine runs very smooth and still. Very respectfully,

H. C. LEONARD, Secretary.

"Standard" Washers Ordered Recently.

	Cu. Ft. per Day
Anneberg Gas Co	200,000
Bombay Gas Co	400,000
Brussels Co	1,250,000
Chemnitz Gas Co	1,000,000
CITIZENS GAS CO., BUFFALO	750,000
Coke Works in Zabre, Ober-Schlesien	1,500,000
Cokerei der Friedenshutte, Upper Silesia	500,000
Dumfries Corporation	250,000
Dunedin Gas Co., New Zealand	400,000
GEORGETOWN, D. C.	250,000
King's Lynn Gas Co	300,000
Leiden, Holland	600,000
Lincoln Gas Co	400,000
Liverpool Gas Co	2,000,000
" "	3,000,000
LOUISVILLE GAS CO.	1,500,00
Numea Gas Co	100,00
PITTSBURGH GAS CO.	1,500,000
PAWTUCKET, R. I.	500,000
PORTLAND GAS CO., Oregon	562,500
SAN FRANCISCO GAS CO.	4,000,000
Sheepbridge	40,000
ST. LOUIS GAS CO.	2,000,000
Sydney Gas Co	2,500,000
WASHINGTON, D. C. GAS CO.	2,000,000
Whitchurch Gas Co	175,000
Total	26,937,500

GEO. SHEPARD PAGE, No. 69 WALL STREET, NEW YORK,

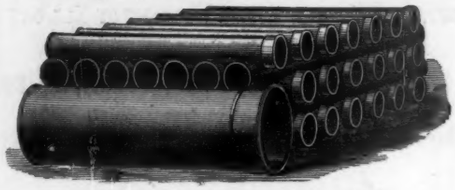
SOLE AGENT FOR THE WESTERN HEMISPHERE.

R. D. WOOD & CO.,

400 Chestnut Street, Phila., Pa.

Cast Iron Gas & Water Pipe, Water Machinery & Gas Apparatus

Cast Iron Pipe, Fire Hydrants, Eddy Valves, Lamp Posts, Large Loam Castings, Flanged Pipe, Sugar House Work, Iron Roofs and Floors, Wrought & Cast Iron Tanks, Turbine Water Wheels and Pumps.



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Manufacturers of Heavy Castings and Machinery of Every Description.

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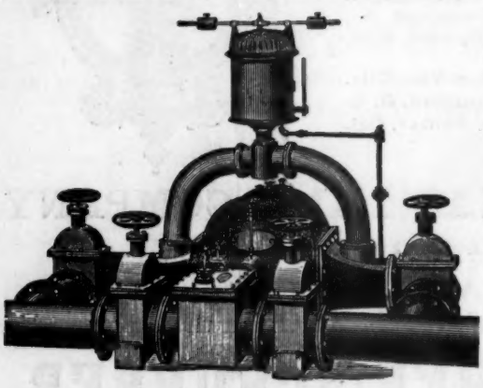

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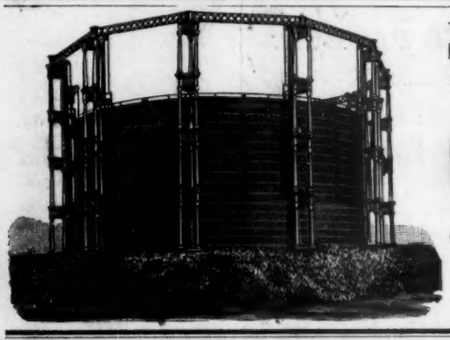

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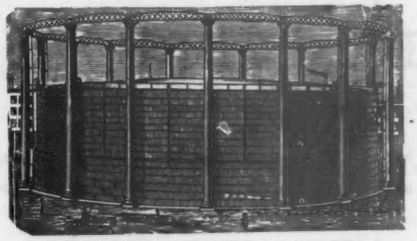

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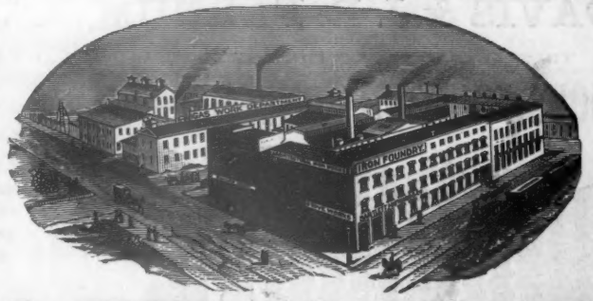

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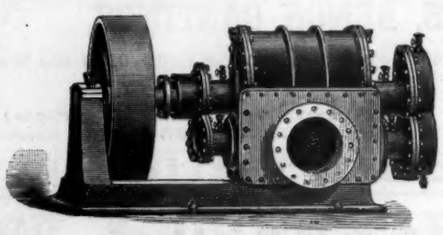

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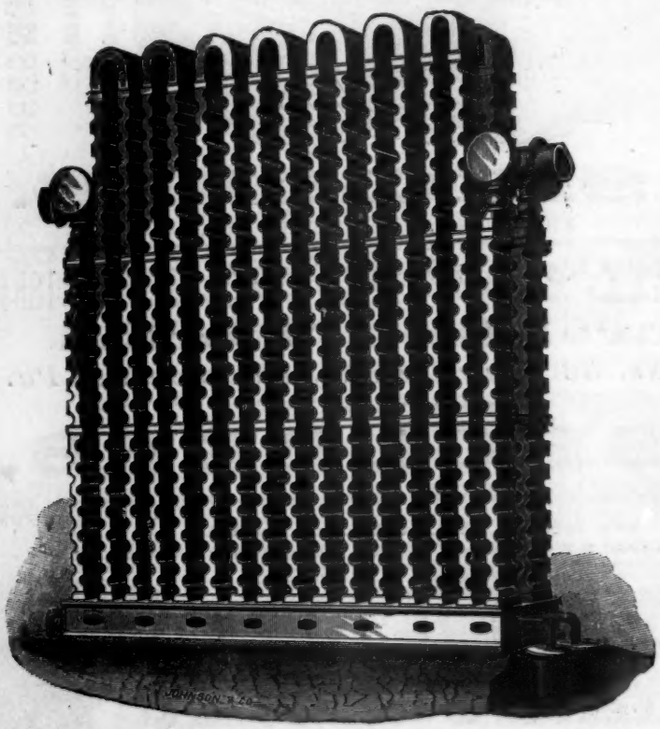

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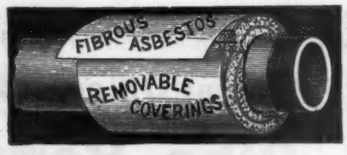

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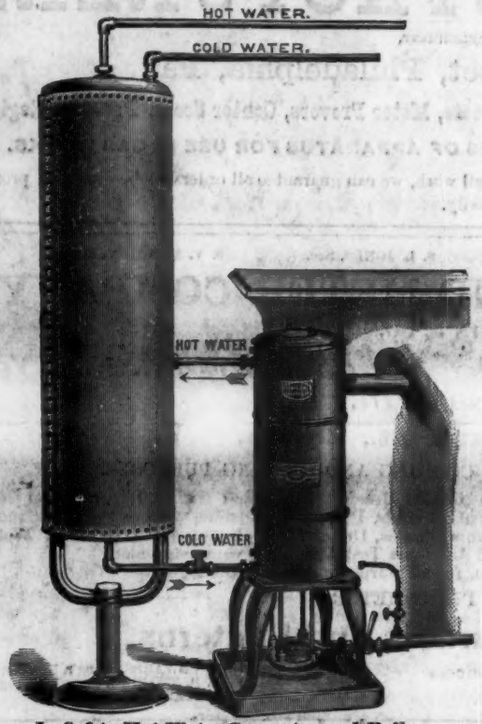
"SUN DIAL" GAS STOVES

The Most Economical, Efficient, and Durable Gas Stove Made.



I.—Safety Hot Water Generator and Boiler.

II.—Gas Cooking Stove No. 8 B.

Safety Hot Water Generator and Boiler.

Cut I. represents our Safety Gas Hot Water Generator and Boiler, arranged for home use. This most easy, quick, and economical way of preparing a warm bath, or for heating water for any domestic purpose, entirely supersedes any necessity for the use of ranges or stoves—a great comfort, particularly in hot weather. The boiler being self-filling, as the hot water is drawn off, can never become empty, thus preventing the possibility of any accident.

We beg to call attention to the cast iron pan which is now attached to the legs of the Generator (see illustration). This is to catch the drippings from the Coil, which many persons suppose come from a leak, when in fact they are produced by condensation. This condensation is caused by the hot flame coming in contact with the coil filled with cold water.

New Style Gas Cooking Stove.

Cut II. represents our New Style Cooking Stove. As will be seen, it has an ornamented cast iron base and front, and extension shelves. The oven burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent applied for). The ovens are of greater capacity than those of the old style. The top, in conjunction with the outlet pipe, is designed to carry off all products of combustion; hence the outlet pipe must be connected with a flue, or the stove will not work properly.

This Stove has 4 boiling burners in top of hot plate. All fittings are nickel plated. We are making this style of Cooking Stove in the following sizes—viz., No. 7 B, No. 8 B, No. 9 B, and No. 10 B.

III.—Improved Hot Plate, No. 108.

New Style Hot Plates.

Cut III. represents our New Style of Hot Plates, of which we are making No. 106 (two small boiling burners), No. 107 (two medium sized boiling burners), and No. 108 (two medium and one large boiling burner). See new Catalogue and Price List for further particulars.